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THE *Railroad Gazette* publishes elaborate statistics of our railroad earnings in 1884, from which it appears that 84 roads have a total mileage of 62,847 miles, or 3134 miles (5·2 per cent) more than in 1883. The total earnings were $410,536,791, or $16,356,471 (3·7 per cent) less than in 1883. The earnings per mile were $6532, or 8·6 per cent less than in 1883.

IN another column, we give a description of the Honigmann fireless locomotive, which can not fail to interest our readers. This engine, which makes neither noise, smoke, nor steam, would be admirably adapted to use in mines and tunnels, and on city roads, where smoke is objectionable. It appears to be about as economical as the ordinary locomotive, and its advantages and simplicity should secure its prompt introduction into this country.

THE great Rio Tinto Copper Mining Company is severely criticised in some of the English papers for declaring dividends out of capital, by the familar device of charging "exploration and developing" of the property to capital account, and thus making the net profits appear that much greater than they actually are. Such devices are not unknown in this country, also, as we have frequently shown in these columns. We may have occasion to cite recent examples in an early issue.

WE have received from Mr. FREDERICK G. CORNING a copy of his very interesting report on the Tipuani gold deposits in Bolivia. This is one of the sources of wealth that drew down upon the favored home of the Incas the cupidity and cruelty of the Spaniards. The official records of Bolivia are said to show that in the year 1882–83 the exports of the precious metals amounted to about twenty-one million dollars, the greater part of which was silver and came from the Potosi District; but Mr. CORNING thinks that the ancient gold gravels of the Tipuani River still offer a profitable field for the investment of capital.

THE Horn-Silver mine has for some years been the most productive silver-lead mine in this country, and it has always been a well and honestly managed enterprise. It is with great regret we notice in the company's report, published in another column, that the mine is not now looking very well, the ore in the eighth level not having come up to expectation, and the reserves above it being nearly exhausted. It is to be hoped the vein will be found in good condition on the ninth and lower levels, which the company proposes to open, and that new ore-bodies may be found to add to the already magnificent record of this great mine.

SCIENTIFIC BALLAST.

We have noticed floating around through our exchanges from both sides of the Atlantic a paragraph with this title, and purporting to record a commonplace occurrence of a car-load of old fossils coming from "down East" to one of our great colleges, and which an intelligent conductor, finding switched off on some siding, took along with a lot of other ballast and dumped it in to make a railroad embankment.

That our matter of fact English contemporaries should have taken this story literally does not surprise us; for they naturally take every thing *au grand sérieux*, from O'DONOVAN ROSSA's dynamite talk to the prospectus prophecies of an English mine promoter; but we are astonished that our sprightly and imaginative American contemporaries should not have perceived that the story in the paragraph was purely and simply an allegory.

The fossils from "down East" no doubt arrived safely at the great college, and were duly distributed among the other seats of learning that cover the land. Each of us is acquainted with many of these magnificent old fossils, which, though not shelved, yet fill the boards of many of our scientific institutions. The intelligent conductor in the allegory, whose zeal for the useful prompted him to turn the old fossils to practical account, simply illustrated the modern idea of making science the ballast or foundation on which to erect some structure of practical utility. This was evidently the meaning of the paragraphist: but a moment's consideration opens up to view a vast number of other useful applications of scientific ballast.

Those "practical" men who find 90 per cent iron ore; those who confidently assure willing believers that veins always become richer as greater depth is attained; those who can with a divining-rod find mines and tell the kind of metal to be met with and the depth at which it lies; those who gravely assure investors that the quantity of ore in a given mine is "inexhaustible;" and those who can estimate to the odd cent the value of an ore-reserve—all lack scientific ballast; so does the metallurgical crank who has a process that "revolutionizes" metallurgy and "controverts science." The crank who gets more out of an ore than the chemists can find in it by assay, or who, by the addition of some "secret" nostrum, can get tin out of Lehigh blast-furnace slag, or do other equally marvelous things, lacks both scientific and moral ballast.

Each of our readers can name several of his acquaintances who lack the one or the other or both of these kinds of ballast, and the shelves of our sanctum contain volumes of proof that the lack of scientific ballast is by no means uncommon among more or less well-known technical writers.

THE PHILADELPHIA & READING RAILROAD AND COAL AND IRON COMPANIES.

The companies have issued their annual report, which, as usual, gives in the fullest detail a vast amount of valuable information. The manner in which this company has always made public the details of its receipts and expenditures is an example that should be followed by some of the other coal and railroad companies. A large part of the report is occupied with a discussion of the proposed financial plans, which have for object:

1st. To reduce fixed charges to the limits of last year's earnings.

2d. To preserve the proper order of priorities of each class of security that is converted into income obligations, so that no income applica-

ble to any senior security that remains unpaid can by any possibility be diverted to pay the interest on a junior security.

3d. To provide a method of paying the floating debt.

This plan appears to be worthy of and to command the approval of the solid, conservative men in the organization, and we hope that through it the company will be put in a stronger financial position than it has held for some years. This scaling down of interest is what has been going on in every class of investments for some years; and those who have their money in the securities of this company will certainly act wisely in conceding temporarily a portion of their interest to enable the company to hold together the immensely valuable property it controls. The dock property of the Jersey Central has been valued at an amount that would pay off the entire indebtedness of that company, and its control by the Reading is an advantage that every creditor of the Reading is interested in maintaining.

The report of the General Manager of the Philadelphia & Reading Coal and Iron Company, Mr. S. B. WHITING, contains the usual amount of valuable information. We make the following extracts from it:

"There are now on the lands owned and controlled by this company sixty-nine collieries, exclusive of small operations. Of this number, forty-eight have been worked during the year by this company, nine have been leased to other parties, and twelve have been temporarily idle or undergoing repairs. This company has also worked fourteen collieries leased from the owners of other lands. We have acquired during the year eight collieries, namely, Rausch Creek, Lincoln, Kalmia, Suffolk, Monitor, and Greenback, on lands owned and controlled by this company, and Kohinoor and Stanton on lands leased from others.

The following figures show the tonnage for the year:

	Tons.	Tons.
Mined by the company from lands owned and controlled	3,928,112.00	
Mined by the company from other lands	997,875.04	
Total tonnage mined by the company		4,925,987.04
Mined by tenants from lands owned by the company	479,463.07	
Mined by tenants from lands controlled by the company	267,233.19	746,697.06
Total tonnage		5,672,684.10

"The tonnage mined by this company shows an increase of 343,320 tons over the shipments of the previous year, and is equal to 25,723 tons per day for each full day worked. The shipments for the month of August reached 649,480 tons, or 113,639 tons greater than any previous month, and equal to 27,520 tons for each full day worked.

"Mining was suspended by agreement during one hundred and six working days of the past year. If full-time had been worked, the shipments from the collieries worked by this company would probably have reached 7,500,000 tons. The collieries operated by this company are in excellent condition, and are prepared to ship 7,500,000 tons during the coming year, provided they are worked continuously. All preparatory and dead-work, such as gangways, chutes, headings, air-ways, tunnels, cut coal, etc., and also the outside improvements, breakers, and machinery, are well advanced, and are equal to any anticipated requirements.

"The sum of $962,606.90 has been expended during the year upon improvements, such as breakers, machinery, slopes, tunnels, additional dead-work, and equipments at the several collieries. This amount is equal to nineteen and a half cents per ton upon the shipments of the year. Our collieries have worked 191 5/10 full days in 1884, as compared with 227 5/10 days in 1883; 205 5/10 days in 1882; 198 3/10 days in 1881; 173 3/10 days in 1880; 243 5/10 days in 1879; and 167 7/10 days in 1878.

"The cost per ton for mining coal in 1884 is $1.47 8/10 cents, and was $1.49 5/10 cents in 1883; $1.47 1/10 cents in 1882; $1.49 7/10 cents in 1881; and $1.43 1/10 cents in 1880.

"The iron ore mines have been idle during the year, excepting the Cumberland ore-banks, which have been worked 70 8/10 days."

A large amount of work was done at the company's Pottsville and Reading machine-shops. Nearly 18,000 tons of iron castings, nearly 6,000,000 pounds of iron forgings, 22 locomotives built and 331 repaired, were among the items that show the magnitude of the operations conducted in this department. The company is fortunate in having in charge of its mining and mechanical department Mr. WHITING, one of the ablest mechanical engineers of our day, a gentleman whose long practical experience and great technical skill are fitly supplemented by a sterling probity that secure for the company the guarantee of efficiency and economy in the administration of this most important department. In fact, the administration of the Reading Company under Mr. GOWEN and Mr. KEIM, though open to criticism as to policy and in some respects disastrous financially, has always been characterized by ability and integrity in the administration of its several departments—not a small thing to say in these times of moral obliquity.

Artesian Wells of New York City.—From a report by Dr. Cyrus Edson, Chief Inspector of the Health Department, we learn that of nine wells examined by Dr. Waller (the waters of eight of which were used, without treatment, in the manufacture of soda and mineral waters), all but one, which was pronounced "doubtful," are characterized as "bad and extremely dangerous for drinking purposes." All but one of the wells are under seventy feet deep. The explanation of this pollution is given as follows: "The strata composing the island, originally deposited in a horizontal position, have been thrown into folds, probably by the geological changes effected by the eruption of the material now forming the Palisades (the trap—a solidified form of lava). After that, the valley of the Hudson became the bed of an immense glacier, which ground off the top of the ridges, at the same time filling up the hollows with the boulders, sand, and other *detritus* that it carried with it. The result is, that our island consists of the upturned edges of the strata so worn off, and any water falling on the surface soaks in, guided by the trend of the strata, to make its appearance in a well (wherever such may be sunk) on the island. In other words, the water in any of the wells, however deep, is the drainage from the district closely adjacent to the spot where the well is sunk."

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

Coal-Dust in Colliery Explosions.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Under the title of Notes on Coal-Dust in Colliery Explosions, Mr. E. S. Hutchinson has given a most able and interesting *résumé* of this subject, republished in your JOURNAL of the 10th and 17th inst., and to be continued. As I am largely interested in the whole question, I trust you will allow me to explain one or two of the supposed inconsistencies in my treatment of it that Mr. Hutchinson has pointed out.

Page 35, referring to my No. III. paper to the Royal Society, Mr. Hutchinson quotes: "The flame of the coal-dust appears to be self-supporting in pure air, but it can not get much beyond the point to which the more energetic action of the fire-damp explosion has extended;" and adds, "This conclusion, it will be observed, does not appear to be quite in harmony with Mr. Galloway's previous statement that coal-dust is capable of extending indefinitely throughout a mine a local explosion of fire-damp."

The quotation should have been: "The flame of the coal-dust appears to be self-supporting in pure air, but *it can not keep up the disturbance necessary to supply itself with fuel on this small scale*, and consequently it can not get much beyond the point," etc. I have italicized the words left out, for which I do not think Mr. Hutchinson is responsible, as I have seen the misquotation before. In this place, I speak simply of the small scale experiment, and not of a colliery explosion.

Again on page 35: "The coal-dust used had been deposited in a still atmosphere within a building in which coal had been ground for coke-making." "He states that he could not obtain the results he had previously obtained with dust taken from screens nor from mine roadways, thus showing a marked difference between his results and those of Professor Abel."

The statement in my No. IV. paper is: "I could not obtain the results described in my previous papers, and in the present one, with dust taken from screens or from the roadways of mines; for, on the one hand, the dust from screens seems to have lost its finest particles before being deposited, and, on the other hand, *the feeble nature of my explosion* prevented me from attempting the winnowing operation to which I imagine the dust in mines is subjected before it is required to propagate the flame of an explosion."

In this place, I speak of my experiments in which *the initial impulse* was given by the explosion of a small quantity of fire-damp and air mixed. Sir Frederick Abel did not make any experiments of this kind to my knowledge, and consequently he had no results to compare with mine. On the other hand, I obtained all the results with dust taken from screens and from the roadways of mines in my current apparatus, which was the one employed by Sir Frederick Abel, when I made use of the same proportions of fire-damp as he did, namely, from 2 to 3 per cent or more.

Page 36: "No table," says Mr. Hutchinson, "is given in this paper, No. IV., showing the results of either chemical or microscopical examination of the dust used, from which we may infer that Mr. Galloway did not consider this important, which agrees with his testimony given before the Royal Commission."

The dust used came, as I stated in the paper, from the same source as that employed in the other experiments, and I gave a complete analysis of it in my first paper."

Again on page 36, Mr. Hutchinson says, in reference to my remark that the fineness and dryness of the dust should be unquestionable before an explosion could be obtained with a mixture of air and dust alone: "This is somewhat different from his reply to Professor Abel, one of the Royal Commission, that his experiments in coal-dust of one and the same description but of different degrees of dryness seemed to give very much the same result."

There is here a mistake. From the very first I have held that the dust must be fine and dry. (See my evidence before the Coroners' Jury on the Llan Colliery Explosion, published in the Cardiff *Western Mail* newspaper of December 23d, 1875.) What Sir Frederick's question or my answer may have been, I know not; but if I had had the opportunity of revising the proof of my evidence before the Royal Commission, I should have eliminated any error of this kind from it, and thus have prevented its perpetuation as in the present case.

I feel quite sure, in conclusion, that Mr. Hutchinson desires to do his duty honorably and well as a historian of the subject, and that he will thank me for pointing out these discrepancies, which I believe are not of his making. I beg to inclose copies of the two papers referred to.

I am, sir, your obedient servant, W. GALLOWAY.

CARDIFF, Jan. 30, 1885.

NEW PUBLICATIONS.

COAL MINING DESCRIBED AND ILLUSTRATED. By THOMAS H. WALTON, Mining Engineer. Philadelphia: Henry Carey Baird & Co. 1885. Quarto, 175 pages. (Index and Illustrations.) Price, $5.

This book gives largely, in a dialogue form, a description of coal mining some years ago in the north of England, and a brief description of anthracite mining in Pennsylvania. It is illustrated in a manner that reminds one of the inscriptions on Egyptian or Persian monuments; a complete disregard for scale or perspective or details of construction characterizes most of the drawings. The author lets us into the otherwise inscrutable secret of the *raison d'être* of the book when he says that in publishing it he has "a consciousness of having thus done something toward performing his duty toward his fellow-man." Questions of conscience and faith are above criticism. The publishers' work is done in the usual admirable style of Messrs. Henry Carey Baird & Co., and is worthy of better material.

THE AMERICAN METAL MARKETS IN 1884.

Lead.—At times, the movements of lead in 1884 were erratic, being largely influenced by the apparently rapidly changing views of a few. During the greater part of the year, the metal was well sustained, comparatively speaking, and it did not suffer so sharply from a decline in values as many other staples. On the whole, consumption during the year was satisfactory, considering the depressed condition of all manufacturing interests, and this was particularly the case in the West. The metal appears to be now approaching an important period, so far as values are concerned, and opinions differ very widely as to its statistical position. The figures of the production that we are in a position to submit may shed some light on the subject, though they do not deal with the all-important question of present stocks in first hands. On that point, opinions differ widely. The only fact that is known is, that the Richmond Company, of Nevada, is still carrying between 10,000 and 11,000 tons, which, however, at present prices, are generally understood to be out of the market. How much more bullion refiners have on hand, what their stocks at works and at distributing points really are, can not be ascertained with any degree of accuracy.

The figures that we present below, however, prove beyond peradventure the important point that, as compared with 1883, there was a decline, trifling it is true, but still the first decline for many years in the output of lead. We do not attribute this falling off to any suffering growing out of low prices. There is nothing discouraging in lead at 3·75 cents at New York, which was about the average of sales last year, as compared with 4·25 cents in 1883. It is due rather to the fact that some important mines have fallen off in production, while the new producers have not compensated for that amount. How far this is likely to gain in strength during the current year it is impossible to guess, though the condition of some of the leading contributors to the lead product is such that there may be a more decided forced curtailment.

Through the courtesy of Mr. Albert Williams, Jr., Chief of the Bureau of Statistics and Technology of the U. S. Geological Survey, we have been favored with a statement of the production in 1883 and 1884, as follows:

LEAD PRODUCTION OF THE UNITED STATES.

	1883. Tons.	1884. Tons.
Desilverized	122,157	119,965
Non-argentiferous	21,800	19,932
	143,957	139,897

The figures for the desilverized lead include the official returns of every refining-works in the country, with the exception of the Castle Dome works in California, which has been estimated. The lead from these works goes directly to one large consumer on the Pacific coast, and does not affect the general market. The lead reported under non-argentiferous includes a small quantity made in Virginia, the rest coming from Missouri, Kansas, Illinois, and Wisconsin.

This compares with former years as follows, the data for 1870 to 1882, both inclusive, being taken from the report published in the *Mineral Resources of the United States*, by the U. S. Geological Survey, under the direction of Mr. Albert Williams, Jr.:

PRODUCTION OF LEAD IN THE UNITED STATES.

	Net tons.		Net tons.
1870	17,830	1878	91,060
1871	20,000	1879	92,780
1872	25,880	1880	97,825
1873	42,540	1881	117,085
1874	52,080	1882	132,890
1875	59,640	1883	143,957
1876	64,070	1884	139,897
1877	81,900		

Since 1870, therefore, the year 1884 records the first instance of a falling off in the production. In spite of this, the United States remains the greatest lead-producing country in the world; a fact which we are sorry to note American technical journals do not seem to be aware of, when they persist in claiming that Spain is ahead.

The following table will show the course of values in 1884:

PRICE OF LEAD IN 1884 IN NEW YORK.

Month.	Highest.	Lowest.	Month.	Highest.	Lowest.
January	4·50	3·75	July	3·70	3·55
February	4·10	3·75	August	3·70	3·52½
March	4·15	4·10	September	3·75	3·55
April	4·05	3·62½	October	3·75	3·60
May	3·75	3·52½	November	3·55	3·37½
June	3·65	3·57½	December	3·75	3·50

Average price in 1884, 3·75c.

The month of January was one of the most active and excited that had been seen in the lead trade in New York for some time, leading to transactions figuring up some 8000 tons, the chief operator for a rise having appeared and driven the price from 3·60 to 4·37½ cents. The market could not be sustained, however, and soon recoiled at 3·90 cents, at which it closed. In February, the same operator made a renewed attempt at lead speculation without any better success, manufacturers still holding too much lead from their previous November purchases; the price was temporarily pushed to 4·05@4·10 cents, but returned to 4 cents, at which it closed dull. A more confident feeling obtained in March. Bad roads in the West, in consequence of a long and severe winter, high freights, and a scarcity of ores combined to curtail production, and as at the same time white lead manufacturers agreed to raise the price for their product one quarter of a cent, the price of lead at New York advanced to 4·15 cents, sales amounting to 3000 tons.

In April, it was found that the spring trade, especially in lead, was a great disappointment; hence those still interested in lead came to the resolution to close out, 9000 tons changing hands, 6000 of which to be delivered gradually during the ensuing five months, at 3¾ cents, to which figure lead declined from 4⅛ cents early in the month, closing with sales at 3·70 cents. All the speculative holdings had thus passed into the hands of *bona-fide* consumers. Although it was reported early in May that production at Leadville had not yet been fully resumed, great flatness prevailed in the New York lead market, manufacturers being sufficiently stocked and corroders not being sanguine about the near future. After fluctuating during the month between 3·55 and 3·80 cents, lead finally closed at 3·70 cents, sales amounting to 1500 tons. On May 22d and 23d, lead refiners met at Chicago for the purpose of agreeing, if possible, about the price at which lead was to be sold during the summer months, the proposition being to enhance it, but no understanding could be arrived at. In June, the plumbers' strike took away from lead the little strength that was left, and it remained neglected, although it was reported that at various points at the West production had not been resumed. Hardly any thing transpiring, the price receded to 3·60 cents. Although the plumbers' strike was of but short duration, other strikes bearing on building supervened; hence the dealings during the month of July were confined to 2000 tons at 3⅝ cents, which was also the closing figure. Meanwhile, production had returned to a normal state. August being generally the month in which our most active lead season sets in, there was considerable disappointment at the slowness of revival. The chief operator, perceiving this, availed himself of the lull, which continued through the ensuing month, in order to depress the market, dull and weak as it was, still further if possible. There were sold in August some 2000 tons from 3·60 cents down to 3·52½ cents, the market finally righting again and closing at 3·55@3·57½ cents.

In September, the market continued lifeless and depressed till about the close of the month, when the operator alluded to, having secured lead enough, tried to produce an advance, in which, however, he was but partially successful, sales being restricted to 2500 tons, the price improving from 3½ cents to 3¾ cents. The speculation for a rise was continued into the month of October, when 3·80 cents was realized for a few lots, the price then suddenly receding to 3·65 cents, total sales amounting to some 2500 tons. The fall trade not having answered expectations, and the West accumulating stock, a downward turn occurred in lead prices in November, when, with sales of 2000 tons, the price suddenly gave way in New York from 3·62½@3·30 cents. In December, there arrived rather better accounts from the West, where, in Colorado, coke was reported to be scarce; it was at the same time reported that Leadville had fallen off 600 tons in November, and asserted that Colorado would show that there was a falling off in ore production there this year of 40,000 tons. The market in New York advanced from 3·40@3·70 cents, closing flat at 3·60 cents, when it was ascertained that white-lead manufacturers assembled at Pittsburg had failed to agree about the price.

OFFICIAL REPORTS AND STATEMENTS.

The Horn-Silver Mining Co., Frisco, Utah.

The following extracts from the official report of this company show the present condition of the property, and the reason for passing the usual quarterly dividend:

The machinery at shaft No. 1 has been in constant use, and has been taxed to its utmost capacity. There have been hoisted during the year 52,524 pit cars of ore and waste. Great care has been exercised and much repairing done on this engine. It has not been possible to accumulate much ore, and but little dead-work could be done where waste had to be hoisted—the engine could not do the work. Only where it was possible to dump the waste into the stopes could prospecting-drifts be run.

There have been hoisted during the year forty thousand tons of ore, of an average assay of 30·9 per cent lead and 39 ounces of silver per ton, costing, delivered on cars, including dead-work, surface work, and supplies, $5.07 per ton. There have been produced 940 car-loads, 300 bars each, of bullion, of an average assay of 123·89 ounces silver per ton, costing to smelt per ton of ore, $14.24, and to produce each ton of bullion, $48.43.

The entire product for the year is 23,107,124 pounds of lead and 1,437,484·85 ounces of silver. The enhanced cost of smelting is caused by the increased amount of silica and copper in the ore.

This ore has been loaded upon 3332 railroad cars, averaging 12½ tons per car, and has cost to load 12½ cents per ton. There have been paid to the Utah Central Railroad freight on this ore $224,002.30, and to the same company, for freight on all materials and supplies received, nearly $360,000.

There have been received and used at Frisco 427½ tanks of water, hauled by the railroad from Black Rock, forty miles distant.

There have been 27,005 days' work on ore extraction, 4203¼ on dead-work, 6778 on surface work, 7122¼ account of shaft No. 3, and 1582 days on contract work.

There have been received 1,316,030 feet of mine timbers and 165,181 feet of lumber for construction, of which 207,560 feet of timber and 31,243 feet of plank remain on hand at the mine. There is, in addition to the stock of timber on hand at the mine, a large lot of both timber and plank at Milford, upon which some money has been advanced, and which will be delivered as wanted.

The dead-work in the mine consists of 1877 feet of drifts driven and 60 feet of winze sunk.

Supplies include timber, fuel, powder, fuse, candles, oil, steel, and tools.

Surface work includes unloading timbers and coal, cutting and framing timber, loading ore on cars, and pay of engineers, blacksmiths, and top car men.

For reasons already stated, it has not been possible during the year to keep the dead-work ahead as was desirable and necessary, and at the same time, to furnish the large supply of ore demanded by the furnaces.

At time of writing, the eighth level has not developed ore as was expected, and no work can be done below this level. The levels above the eighth have furnished the supply for the year, and are now showing the effects of the drain upon them. While they are not exhausted, it is not considered good policy to continue mining and smelting until more ore ground is opened, which can now be done through shaft No. 3.

It is intended to do all of the work of the mine through this shaft, as soon as the railroad spur is finished, and bins built, discontinuing all work at shaft No. 1 as soon thereafter as possible. The ground is settling over and around the caved ground, and while it may not reach the engines, it is prudent to at least be prepared to move them if their safety becomes endangered.

Excepting the time consumed in necessary repairs, the furnaces have been run continuously during the year. They have been shut down for cleaning, barring, and repairs a time equal to 137 days and 9 hours for

one furnace. The engine has been shut down but 9 hours during the entire year. The slagging-furnace has been run 34 days.

The cast-iron retaining plates at the base of one of the furnaces giving out, they were replaced by wrought plates at much less cost than cast ones. It is believed these wrought plates will outlast the cast ones.

After some fluctuations in prices of coke, a pool has been formed by the railroads, and Crested Butte coke is now furnished at $16 per ton. Prices of other supplies remain unchanged. Freight upon bullion is $18 to the Missouri River.

Owing to the impossibility of making any considerable progress in prospecting, there is but little ground opened, and not a great amount of ore exposed in the mines.

The furnaces and machinery at Francklyn need overhauling and repairing.

Prices for both lead and silver are low, and the railroads are not inclined to favor us at all in the matter of freights or supplies; for these reasons, it is believed to be good policy to close down the smelters for a time.

STATEMENT—YEAR ENDED DECEMBER 31st, 1884.

1884.		Tons ore smelted.	Tons lead produced.	Ounces silver produced.
Quarter ended	March 31st	8,401	2,243	376,401·25
	June 30th	9,216	2,639	380,648·72
	September 30th	10,606	3,177	416,504·38
	December 31st	11,230	3,494	263,961·82
		39,453	11.553	1,437,516·17
	[1883		14 923	1,133,382]
Lead valued at	say $68.50 per ton		$790,858.00	
Silver "	" $1·095 per oz		1,575,989.54	
Total value product, estimated			$2,366,847.54	

Actual Receipts, Sales Silver, Lead, etc.

1884.		Sundries.	Lead.	Silver.	Total.
Quarter ended	March 31st	$111.00	$132,350.20	$477,884.71	$610,346.00
	June 30th	1,889.82	203,866.96	425,838.24	631,595.02
	September 30th		215,628.47	478.375 36	694,003.83
	December 31st	1,923.59	155.359.30	357,126.80	514,409.69
		$3,924.41	$707,205.02	$1,739,225.11	$2,450,354.54

Operating Expenses.

1884.			
Quarter ended	March 31st	$333,878.91	
	June 30th	302,435.74	
	September 30th	347.047.07	
	December 31st	369,707.86	$1,353,069.58
Construction of new shaft, etc			94,139.32
Total of operating expenses and construction			$1,447,208.90

Dividends.

No. 12, February 15th, 1884, 3 per cent	$300,000		
13, May 15th, " "	300,000		
14, August 15th, " "	300,000		
15, November 15th, " "	300,000	$1,200,000.00	$2,647,208.90

Osceola Consolidated Mining Company, Mich.

The statement of business for 1884 shows that the earnings of the year did not equal the amount of dividends paid by $12,425.87. This deficit was taken from the surplus fund, which, together with $18,232.43 spent in construction, has reduced this fund from $262,188.50, as shown on January 1st, 1884, to $231,530.20 on January 1st of the present year.

It has hitherto been the policy of the company never to divide in excess of its earnings, and it would seem that it was not wise to make the last dividend; but it must be remembered that at the time it was declared, in September last, copper was selling at from 13⅛ cents to 13¼ cents a pound, at which price the mine would easily have earned what it divided. Before the close of that month, however, the price of copper began to drop, and fell rapidly during the last four months of the year, until in December it seemed to find bottom at 10¼ cents.

This state of things could not have been foreseen; for, until the year just closed, copper has never been sold in this country for less than 15½ cents.

In consequence of this depression, the payment of dividends has necessarily been suspended for the present. The company, however, is contemplating improvements in the direction of economic production that should enable it to earn something even with copper selling at 10¼ cents.

The receipts and expenses were as follows:

From sales of 4,247,630 pounds of copper at 12·82		$544 651.02
From sales of silver		2,383.99
From sale of village lot at Hancock		100.00
From interest receipts		5,328.11
Total receipts		$552,463.12
Expenses at mine were	$400,572 81	
Other expenses, such as smelting, transportation, insurance, etc., were	76,816.18	
Making total cost of copper		$477,388 99
Leaving as mining profit		$75,074.13
Add balance of assets, January 1st, 1884	$262,188.50	
Less dividends paid	$87,500.00	
And expenses of construction	18.232.43	105,732.43
Leaves balance of assets, January 1st, 1885		$156,456.07
		$231,530.20

Mining in the United States of Colombia.—Vice-Consul White, reporting on the commerce of Medellin, Colombia, mentions that gold and silver mining is the most important local industry, and supplies six sevenths of the value of the total exports, some $3,000,000 being forwarded to Europe annually from the State of Antioquia; but owing to difficulties of transport, high customs duties, etc., the mines are worked under great disadvantages. Foreign mining undertakings there generally fail, owing to the want of sufficient working capital, while the great difficulty experienced in establishing any other industries, owing to the impossibility of transporting adequate machinery over the bad roads, deters capitalists from entering into the many other fields of industry that otherwise could be undertaken to develop the resources of the State. The country possesses iron, coal, and copper mines, conveniently situated.

PRODUCTION OF PIG-IRON IN 1883 AND 1884.

From the *Bulletin* of the Iron and Steel Association, we learn that the total production of pig-iron in the United States was in 1883, 5,146,972 net tons, or 4,595,510 gross tons; in 1884, 4,589,613 net tons, or 4,097,868 gross tons. As compared with the production of 1883, these figures show a decrease of 557,359 tons, or 11 per cent. The year's product was very slightly below that of 1881, the difference being only 51,951 tons. These comparisons indicate that the consumption of pig-iron in 1884 was considerably above the general estimate, and the statistics of stocks of unsold pig-iron that we have collected show that practically the entire output of the year was absorbed, there being only 59,200 net tons more pig-iron on hand at the close of 1884 than at the expiration of 1883. The manufacturers of pig-iron were credited throughout the year with managing their branch of the iron trade with conservatism and with keeping the production within the limits of consumption. How nearly they succeeded in doing this, our figures show:

PRODUCTION.

Fuel Used.	In blast Jan. 1, 1883.	In blast Jan. 1, 1884.	Furnaces Jan. 1, 1885. In.	Out.	Total.	Production. Tons of 2000 lbs. 1883.	1884.
Anthracite	161	118	84	135	219	1,885 596	1,586,453
Charcoal	129	84	66	164	230	571,720	458,418
Bituminous	127	105	86	134	220	2,689,650	2,544,742
Total	417	307	236	433	669	5,146,972	4,589,613

Notwithstanding the general decline in production, there were some remarkable instances of increased output, as represented below:

Districts.	1883. Net tons.	1884. Net tons.	Increase. Net tons.	Per cent.
Illinois	237,657	327,568	89.911	38
Lower Susquehanna (Pa.)	337,419	419,439	82.020	24
Miscellaneous Bituminous (Pa.)	301,564	350,870	49.306	16
Alabama	172,465	189,664	17,199	10
Virginia	152,907	157,483	4,576	3
Wisconsin	51,893	52,815	922	2
Mahoning Valley (Ohio)	244,265	246,288	2.023	1
Texas	2,381	5,140	2,7.9	116

In view of the decreased production in most of the pig-iron districts of the United States, attention is naturally drawn to instances in which some of them have successfully held their own as against the competition of other sections. Conspicuous in this respect stands Tennessee, with a very slight increase, followed by Michigan, with a very slight decrease. Georgia lost but 6 per cent, Pennsylvania only 10 per cent, and the Upper Susquehanna Valley only 10 per cent. Among the smaller producers of pig-iron, there were many cases of heavy diminution in output, but among the principal districts those showing the heaviest decrease are as follows, in the order of tonnage lost: Lehigh Valley, Alleghany County, New York, Schuylkill Valley, New Jersey, Missouri. It is worthy of note in this connection that "the South" (by which is meant all the States south of Pennsylvania and the Ohio River, excluding Missouri) shows a loss of 6 per cent on the production of 1883, the figures for the two years being respectively 699,260 tons and 657,599 tons.

With reference to "fuel used," the production of charcoal pig-iron fell off 20 per cent, anthracite 16 per cent, and bituminous coal and coke only 5 per cent.

It will be seen that, though there was a slightly increased stock of pig-iron on hand at the end of the year, the increase was insignificant except as it referred to charcoal pig-iron.

STOCKS UNSOLD.

Fuel Used.	Tons of 2000 lbs. Jan. 1, 1883.	Jan. 1, 1884.	Jan. 1, 1885.
Bituminous	157.196	171,102	191,845
Anthracite	107,259	178,020	178,993
Charcoal	165,239	183,078	222,162
Total stock unsold	429,694	533,800	593,000

STOCKS OF PIG-IRON IN CERTAIN DISTRICTS.

Pennsylvania.	Lehigh Valley anthracite	24,969	50,600	61,365
	Schuylkill Valley anthracite	24,029	25,448	29,696
	Upper Susquehanna "	11.173	8,839	12,216
	Lower " "	7,935	14,324	10,643
	Shenango Valley coke	22,045	27.195	34,246
	Alleghany County coke	17,272	27,240	15,780
	Miscellaneous coke	33,194	30,822	43,606
	Charcoal	10,241	11,336	14,297
Ohio	Hanging Rock coke	12,608	11,128	5,735
	Mahoning Valley coke	24,672	19.307	16,977
	Hocking Valley coke	6,109	5,153	4,556
	Miscellaneous coke	15,550	12,327	6,329
	Hanging Rock charcoal	27,486	24,236	18,726
	Miscellaneous charcoal	828	985	715

The Perak Tin Mines.—The *Société de Géographie Commerciale*, in the last issue of its journal, contains a brief report upon the tin mines of Perak. In Lower Perak and Kinta, the principal mining districts are Olon-Kinta, Chandenong, Chemor, Yanka, and Khan-Baron, which exported last year 1038 tons, while the total tin exports of Perak have risen from 3054 to 5444 tons in four years, their total value being estimated at £4,500,000. The market for Siamese tin, which is much superior to that of the Siam mines, is at Penang, and from thence most of it is exported to England and her colonies and the United States.

THE FIRELESS LOCOMOTIVE.*

This invention of Mr. Honigmann is based upon the discovery that solutions of caustic soda or potash and other solutions in water, which have high boiling-points, liberate heat while absorbing steam, which heat can be utilized for the production of fresh steam. This is eminently the case with solutions of caustic soda, which completely absorb steam until the boiling-point is nearly reached that corresponds to the degree of dilution. If, therefore, a steam-boiler be surrounded by a vessel containing a solution of hydrate of soda, having a high boiling-point, and if the steam, after having done the work of propelling the pistons of an engine, be conducted with a reduced pressure and a reduced temperature into the solution, the latter, absorbing the steam, is diluted with simultaneous development of heat, which produces fresh steam in the boiler. This process will be made clearer by referring to the following table of the boiling-points of soda solutions of different degrees of concentration, and by the description of an experiment conducted by Professor Riedler with a double cylinder engine and tubular boiler:

Solution of Soda.	Boiling-point, in Centigrades.	Steam pressure above atmospheric pressure in atmospheres.
100 NaOHO + 10 H_2O	256·0 deg. C.	40·0 atm.
" + 20 "	220·5 "	21·0 "
" + 30 "	200·0 "	15·0 "
" + 40 "	185·5 "	10·2 "
" + 50 "	174·5 "	7·7 "
" + 60 "	166·0 "	6·1 "
" + 70 "	159·5 "	5·1 "
" + 80 "	154·0 "	4·2 "
" + 90 "	149·0 "	3·6 "
" + 100 "	144·0 "	3·0 "
" + 120 "	136·0 "	2·2 "
" + 140 "	130·0 "	1·6 "
" + 200 "	120·0 "	0·95 "
" + 300 "	110·3 "	0·4 "
" + 400 "	107·0 "	0·3 "

Experiment.—The boiler of the engine was filled with 231 kilogs. water of 2 atmospheres pressure and a temperature of about 135 degrees Cent.; the soda vessel with 544 kilogs. of soda lye of 22·9 per cent water and a temperature of 200 degrees Cent., its boiling-point being about 218 degrees Cent. The engine overcame the frictional resistance produced by a brake. At starting, the temperature of both liquids had become nearly equal, namely, about 153 degrees Cent. The temperature of the soda lye could therefore be raised by 47 degrees Cent. before boiling took place; but as dilution consequent upon absorption of steam would take place, a boiling-point could only be reached less than 218 degrees Cent., but more than 153 degrees Cent. The engine was then set in motion at 100 revolutions per minute. The steam passing through the engine reached the soda vessel with a temperature of 100 degrees Cent.; the temperature of the soda lye began to rise almost immediately, but at the same time the steam-boiler losing steam above, and not being influenced as quickly by the increased heat below, showed a decrease of temperature. The difference of the two temperatures, which was at starting 1·3 degrees Cent., consequently increased to 7·2 degrees Cent. after 17 minutes, the boiler having then its lowest temperature of 148·8 degrees Cent. After that, both temperatures rose together, the difference between them increasing slightly to 9·5 degrees Cent, and then decreasing continually. After two hours 13 minutes, when the engine had made 12,000 revolutions, the soda solution had reached a temperature of 170·3 degrees Cent., which proved to be its boiling-point. The steam from the engine was now blown off into the open air during the next 24 minutes. This lowered the temperature of both water and soda lye by 10 degrees and re-established its absorbing capacity. The steam produced under these circumstances had of course a smaller pressure than before. In this way, the engine could be driven at reduced steam pressures until the resistance became relatively too great.

The constant rise of both temperatures during the first two hours, which is an undesirable feature of this experiment, was caused by the quantity of soda lye being too great in proportion to that of water, and other experiments have shown that it is also caused by an increased resistance of the engine, and consequent greater consumption of steam. In the latter part of the experiment, where the engine worked with expansion, the rise of the temperature was much less, and by its judicious application, together with a proper proportion between the quantities of the two liquids in the engines, which are now in practical use, the rising of the temperatures has been been avoided. The smaller the difference is between the temperatures of the soda lye and the water, the more favorable is the economical working of the process. It can be attained by an increase of the heating surface as well as by a sparing consumption of steam, together with an ample quantity of soda lye, especially if the steam is made dry by superheating. In a passenger engine that does regular service on the railroad between Würselen and Stolberg, the difference of the two temperatures is generally less than 10 degrees Cent. Diagrams given in the *Engineer* contain the temperatures during the four journeys, which are performed with only one quantity of soda lye during about twelve hours, and show the effects of the changing resistances of the engine and of the duration of the process upon the steam pressure, which, considering the condition of the gradients, are generally not greater than in an ordinary locomotive engine. It can especially be seen from these diagrams that an increase of the resistance is immediately and automatically followed by an increased production of steam. This is an important advantage of the soda engine over the coal-burning engine, in consequence of which less skill is required for the regular production of steam-power. The tramway engines of more recent construction, according to Honigmann's system, are worked with a closed soda vessel in which a pressure of from ½ to 1½ atmospheres is gradually developed during the process. While the counter pressure thus produced offers only a slight disadvantage, being at an average only ½ atmosphere, the absorbing power of the soda lye is materially increased, as shown by the following table, and it is, therefore, possible to work with higher pressures than with an open soda vessel. Besides this great advantage, it is also of importance that the pressure in the steam-boiler can be kept at a more uniform hight.

Zeitschrift des Vereins Deutscher Ingenieure, 1883, p. 730; 1884, p. 69.

TABLE—100 *kilogs. Soda Lye containing 20 Parts Water with a corresponding Boiling Point of 220 degrees Cent. absorb Steam as follows:*

Final Pressure in Condenser.				Pressure in steam-boiler.	Corresponding temperature.
0	½ atm.	1 atm.	1½ atm.		
80 kil.	125 kil.	200 kil.	350 kil.	2 atm.	136·0 deg. C.
65 "	88 "	130 "	190 "	3 "	145·0 "
51 "	70 "	98 "	125 "	4 "	153·3 "
41 "	58 "	80 "	100 "	5 "	160·0 "
34 "	48 "	66 "	80 "	6 "	166·5 "
27 "	40 "	55 "	70 "	7 "	172·1 "
22½ "	33 "	47 "	60 "	8 "	177·4 "
19 "	28 "	41 "	52 "	9 "	182·0 "
16 "	24 "	35 "	46 "	10 "	186·0 "
12 "	18 "	28 "	35 "	12 "	193·7 "
9 "	14 "	22 "	33 "	15 "	200·0 "
2 "	8 "	12 "	21 "	20 "	215·0 "

Not the least important part of the process with regard to its economy is the boiling down of the soda lye, in order to bring it back to the degree of concentration which is required at the beginning of the process. This is done in fixed boilers at a station from which the engines start on their daily service, and to which they return for the purpose of being refilled with concentrated soda lye. It is clear that a closed soda vessel has produced as much steam when the process is over as it has absorbed, and the quantity of coal required for the evaporation of water in concentrating the soda lye can therefore be directly compared with that required in an ordinary engine for the production of an equal quantity of steam. But even at the small installation for the Aix la Chapelle-Burtscheid tramway with only two boilers of four square meters heating surface each, made of cast-iron 20 mm. thick, 1 kilog. of coal converts 6 kilogs. of water contained in the soda lye into steam, while in an ordinary locomotive engine of most modern construction the effect produced is not greater than 1 to 10. There can be no doubt that better results could be obtained if the installation were larger, the construction of the boilers more scientific, and their material copper instead of cast-iron; but even without such improvements, the cost of boiling down the soda lye might be greatly lessened by the use of cheaper fuel than that that is used in locomotive engines, and by the saving in stokers' wages, since stokers would not be required to accompany the engines.

Apart from these considerations, the Honigmann engines have the great advantage that neither smoke nor steam is ejected from them, and that they work noiselessly. The cost of the caustic soda does not form an important item in the economy of the process, as no decrease of the original quantities had been ascertained after a service of four months' duration. Data are given in a report by the chief-engineer of the Aix la Chapelle-Jülich Railroad, Herr Pulzner, which runs as follows:

WÜRSELEN, Dec. 23, 1884.

*A trial trip was arranged on the line Haaren-Würselen, the hardest section of the Aix la Chapelle-Jülich Railroad. This section has a gradient of 1 in 65 on a length of 4 kilos. and two curves of 250 and 300 meters radius and 667 meters length. The goods train consisted of twenty-two goods wagons, sixteen of which were empty and six loaded. The total weight of the wagons was 191,720 kilogs., and this train was drawn by the soda engine with ease and within the regulation time, while the steam pressure was almost constant, namely, five atmospheres. The greatest load admissible for the coal-burning engines of 45,000 kilogs. weight on the same section is 180,000 kilogs.

Proof is therefore given that the soda engine has a working capacity which is at least equal to that of the coal-burning engine. The heating surface of the soda engine, moreover, is 85 square meters, while that of the corresponding new Henschel engine is 92 square meters. On a former occasion, I have already stated that the soda engine is capable not only of performing powerful work and of producing a large quantity of steam during a short time, but also of traveling long distances with the same quantity of soda. Thus, for example, a regular passenger train, with military transport of ten carriages, was conveyed on Nov. 6th, 1884, from Aix la Chapelle to Jülich and back, that is, a distance of 45 kilometers, by means of the fireless engine. The gradients on this line are 1 in 100, 1 in 80, and 1 in 65, being a total elevation of about 200 meters. For a performance like this, a powerful engine is required, and a proof of it can be recognized in the consumption of steam during the journey, for the quantity of water evaporated and absorbed by from 4½ to 5 cubic meters soda lye was 6500 liters.

Another certificate is of equal interest, and runs as follows:

AIX LA CHAPELLE, Jan. 5, 1885.

A fireless soda engine, together with evaporating apparatus, has been at work on the Aix la Chapelle-Burtscheid tramway for the last half-year. In order to test the working capacity of this locomotive engine, and the consumption of fuel on a certain day, the Honigmann locomotive engine was put to work this day from 8.45 o'clock A.M. till 8 o'clock P.M., with a pause of three quarters of an hour for the second quantity of soda lye. The engine was, therefore, at work for fully 10½ hours, namely, 5½ hours with the first quantity and 5 hours with the second. The distance between Heinrichsallee and Wilhelmstrasse, where the engine performed the regular service, is 1 kilo., and there are gradients

Of about 1 in 30 in 400 meters length.
" 1 45 250 "
" 1 72 350 "

This distance was traversed sixty-four times, the total distance, including the journeys to the station, being 66 kilos. The engine gives off fully 15 horse-power on the steepest gradient, the total traction weight being from 8½ to 9 tons; it is worked with an average steam pressure of 5 atmospheres, and has cylinders of 180 mm. diameter and 220 mm. stroke, cog-wheel gear of 2 to 3, and driving-wheels of 700 mm. diameter. The quantity of water evaporated during the service time of 10½ hours was

* *Zeitschrift des Vereins Deutscher Ingenieure*, 1884, p. 978.

found to be about 1600 kilogs., consequently about 800 kilogs. steam were absorbed by one quantity of soda, the weight of which was ascertained at about 1100 kilogs. The average heating surface is 9·8 square meters; the difference of temperature between soda lye and water was toward the end only 3 degrees Cent.; 243 kilogs. pit-coal were used for boiling down the lye for the 10½ hours' service, which corresponds to a 6·6-fold evaporation. (Signed) M. F. GUTERMUTH,
Assistant for Engineering at the Technical High School.
HASELMANN,
Manager of the Aix la Chapelle-Burtscheid Tramway.

Here are some unquestionable results. For nearly a year, the first railroad engine, and for six months the first tramway engine of this new construction have been introduced into regular public service, and have been open to public inspection as well as to the criticism of the scientific world. They are worked with greater ease and simplicity than ordinary locomotive engines; the economy of their working appears, allowing for shortcomings unavoidably attached to small establishments, to be at least equally great; they do not emit either steam or smoke, and their action is as noiseless as that of stationary engines.

TERRIBLE EXPLOSION AT THE VALE COLLIERY, NOVA SCOTIA.

A terrible explosion of fire-damp occurred in one of the pits of this colliery on the evening of the 10th inst.

Vale Colliery employs over 400 men, and lately has been putting out a greater quantity of coal than any other mine in Pictou, working full-time and with an extra force to fill contracts on hand. At the time of the explosion, ten P.M., there were, fortunately, but twenty-two men in the mine. The day men had left the pits for their homes. A new slope was sinking in what is known as the McBean seam. The force of the explosion tore off the covering at the mouth of the shaft and scattered the timber in every direction for a long distance. As soon as possible, Mr. John Greener, the manager, assisted by Manager Rutherford, of Stellarton Mines, made an attempt to descend the shaft; but after proceeding only a short distance, they were forced to turn back on account of the smoke and gas. Shortly afterward, two men, Alexander Reid and D. Adams, came up another shaft, and reported having heard the explosion at the extremity of the shaft, a distance of 2200 feet from the surface. It now became apparent that the mine was on fire, smoke beginning to pour out in great volume and with considerable force. It was then decided to pour water into the pit. This was done as quickly as possible, and in a couple of hours the flames appeared to be extinguished.

Manager Greener and a rescuing party of five men volunteered to enter the pit. They descended in the cage, and the bottom was reached in safety. In order to prevent bad gases interfering with their progress, temporary doors of canvas and brattice-work were constructed to replace those that had been blown down. After making their way some distance, seven of the missing miners were discovered, all close to each other. All were alive, but were fast losing consciousness and barely able to move or speak. They were carried to the foot of the shaft, placed in the cage, and hoisted to the open air. Restoratives promptly applied gradually brought them back to sensibility. All except one were more or less burned and bruised. The rescuers, returning to the pit, resumed their search, but no more men were found alive. The work of the rescuers was promptly and efficiently conducted. After several hours' search, the work being delayed by the necessity for clearing away *débris* and providing ventilation, the bodies of thirteen men were recovered; they were all much burned.

The survivors have little to reveal as to the cause of the explosion. They state that all had just begun work. They were proceeding with their labor as usual, when there was a sudden rush of foul air, a quick, deafening report, and every one was prostrated. The bad gas almost immediately overpowered them. They sank into insensibility and knew of nothing that happened afterward. The managers of the colliery attribute the explosion to the sudden opening of or coming up on a heavy feeder of gas, which, rushing out, was at once ignited by the lamps carried in the caps of the men. Manager Greener explained that, owing to the fact of the absence of any suspicion of the existence of gas in that locality, it was not thought necessary to use other than ordinary lamps. When the day shift left the mine, there was no indication of gas, and the explosion that soon followed was to all a great shock. All the gentlemen present connected with other mines in the county are unanimous in expressing their complete surprise that such an event should have occurred in a mine so generally considered safe and free from bad air.

Vale seams have been operated since 1871, at first the six-foot and latterly a second eight-foot seam. During all that time, no accident of any moment has occurred from explosions, and excepting the fatality of some ten years ago, when a cage containing a number of men broke loose, killing six of them, Vale Colliery has been free from disaster. The mine is owned by a Montreal company, and has lately been raising about four hundred tons of coal per day. The mine horses in the pit at the time were all killed.

The coroner's jury in the case of the Vale Colliery disaster have exonerated the managers of the mine from all blame. The wounded are doing fairly, and it is expected all will recover.

Mineral Exports of Chili.—Nitrate of soda exported in 1883 was 54,745 gross tons; exported 1882, 54,624 gross tons. Germany is steadily increasing her imports of this article. In 1883, she took 462,451 quintals, or more than twice as much as in the preceding year. The shipments of nitrate to the United States are declining. Total exports of iodine in 1883 were 41,666 pounds, or only about half the amount shipped in 1882. This was in part due to a new export, iodide of copper, not previously manufactured in Chili, and of which 117,330 pounds were shipped in 1883. Silver was exported to the value of $2,092,086 in 1883. The copper production increased to 6015 gross tons of ore, which yielded 1228 gross tons of fine copper. Borate of lime was exported for the first time in 1883, to the amount of 32,923 quintals.

MINES OF THE PITTSBURG & WHEELING COAL AND COKE COMPANY.

By our Traveling Correspondent.

Among the many more recent developments of coal property, there is none in Ohio so extensive or important as those on Wheeling Creek. In the Ohio Geological Report, vol. iii., page 286, appears the following: "After making all allowances for waste of every kind, and assuming the thickness of the bed to be only five feet, we find available for transportation, within one mile north and south from Wheeling Creek, more than one hundred and twenty millions of tons of coal." According to the analysis given in the same report, this coal is shown to be rich in fixed carbon and gas, while the percentage of ash is low, showing excellent ealorific qualities. Previous to 1880, there were no mines opened on this extensive and valuable territory. But in 1880, a number of gentlemen, mostly Cleveland parties, formed the Pittsburg & Wheeling Coal and Coke Company, with headquarters in Cleveland. They, having control of the greater part of the most valuable territory in that vicinity, began the work of development, first of what have since been known as Wheeling Creek mines No. 1 and No. 2, situated at Wheeling Creek station on the Cleveland, Lorain & Wheeling (Tuscarawas Valley) Railroad. The mines are in what is classed in the Geological Report as No. 8 (Pittsburg) of the Lower Coal Measures, and lie well up in the mountain-like hills that rise abruptly from the narrow valley of Wheeling Creek. The hills in which these mines are located lie on the right bank of the creek, and are separated by a narrow, deep ravine. Each of the mines had been worked, in a limited way; but the new company found it necessary to begin anew, in order to admit of working on an extensive scale. Accordingly, the old opening of mine No. 1 was abandoned, and a new opening made from a point some 600 yards farther up the ravine, which opening led into the farthermost portions of the old workings 900 yards to the face of the coal.

The tipple being located near the foot of the hill, made necessary a track 2000 feet in length, over which the coal is brought forward by an engine, from the firm of Porter Bell & Co., of Pittsburg. This track has a grade of 3½ feet to the 100, and is laid with 35-pound rails. The coal is brought forward in the mine with mules, and the train made up outside. Twenty-four loaded cars constitute a train, and the round trip can be made in ten minutes. The switch tracks are so arranged as to give gravity, both to bring forward the loaded cars to the dump and to run the empties off, where they are made up into a train ready to be returned to the mine.

When boths screens are used, from 125 to 150 flats can be loaded per day of twelve hours. At mine No. 2, the old opening is still used; but the inside workings have been greatly enlarged and systematically worked, with the view of connecting with a new opening, to be put in at a point opposite the new opening of No. 1 when the output of both mines will be brought forward by the one engine and dumped at the tipple of No. 1.

The arrangements at the incline delivering the cars to the tipple are worthy of special note. There are four tracks at the landings, thus admitting two loaded and two empty cars. The coal is lowered by means of a "monkey," which at the same time returns two empties. The latter, by means of an ingenious arrangement, are carried back from the landing on a side-track, which has a rise of 4 feet, and from the top of which the car, having become automatically released from the draught rope, passes on to that part of the track where the train of empties is made up. Thus, with two men at the landing, it is possible, without other help, to pass 1200 cars a day, or two cars a minute, over the incline to the tipple.

The output from these mines under the present management began in the spring of 1881, and under the direction of Mr. James Patterson, a gentleman who has long been connected with the trade, and who still has charge of the sales department, the coal, being of special value for steam making, met with such favor in the market, that, in 1883, the shipments reached 300,000 tons. The same year, the company began the development of the Pittsburg mine, located at Maynard station, some ten miles farther up the creek. This being an entirely new working, affords a better example of the thorough system and thoughtful attention to details that characterize the entire business and workings of the company. The mine covers about 300 acres, and the coal-bed is from 4½ to 5½ feet in thickness. The two openings are 130 feet apart and 6 feet wide, admitting large-sized bank cars. The tracks from the openings form a junction near the tipple-house, and at this junction are the repair and smith-shops, where both cars and harness are made as well as repaired. A switch 2000 feet in length, with a grade of 18 inches to the 100 feet, connects with the Cleveland, Lorain & Wheeling main line.

Everywhere can be seen evidence of neatness and order. Near the mine openings, are two or three neat houses for the bosses; but the quarters (ninety cottages) for the men are nearly a mile away, and across Wheeling Creek opposite Maynard station. Here again, systematic neatness and a regard for the comfort of the workmen are prominent. The facts that this company has never had a strike, and that its workmen are now mining at 50 cents a ton, prove the value of the system and tact of the management. A good part of the year 1883 was consumed in development and preparation at the Pittsburg. Still there was a considerable output the last half of the year, and now the mine can accommodate 300 workmen and produce 800 tons a day.

At Wheeling Creek station, the company has a coking plant of fifty ovens, where the pea and slack are made into coke, which is also used for steam purposes, as it contains too much sulphur for iron making.

The mines are but 150 miles from Lorain, the northern or lake terminus of the Cleveland, Lorain & Wheeling Railroad, and where excellent shipping facilities are afforded, thus giving to the company an advantage in haulage over any competing coal. The year 1884 was an unusually dull one for the trade generally, and this company was no exception to the rule; but with a return of business prosperity for the shops and factories, and an increased consumption on the part of the different railroads, there will again be a large demand; and when that time comes, the justly earned reputation of the "Ohio steam coal" furnished by the Pittsburg & Wheeling Coal and Coke Company, together with its systematic facilities and extensive capacity, will enable it to be one of the favored ones competing for the large contracts of the lakes and the West and Northwest trade.

MAN'S AUTOMATIC CUT-OFF VALVE APPLIED TO SINGLE-ACTING TRUNK PISTON ENGINES.

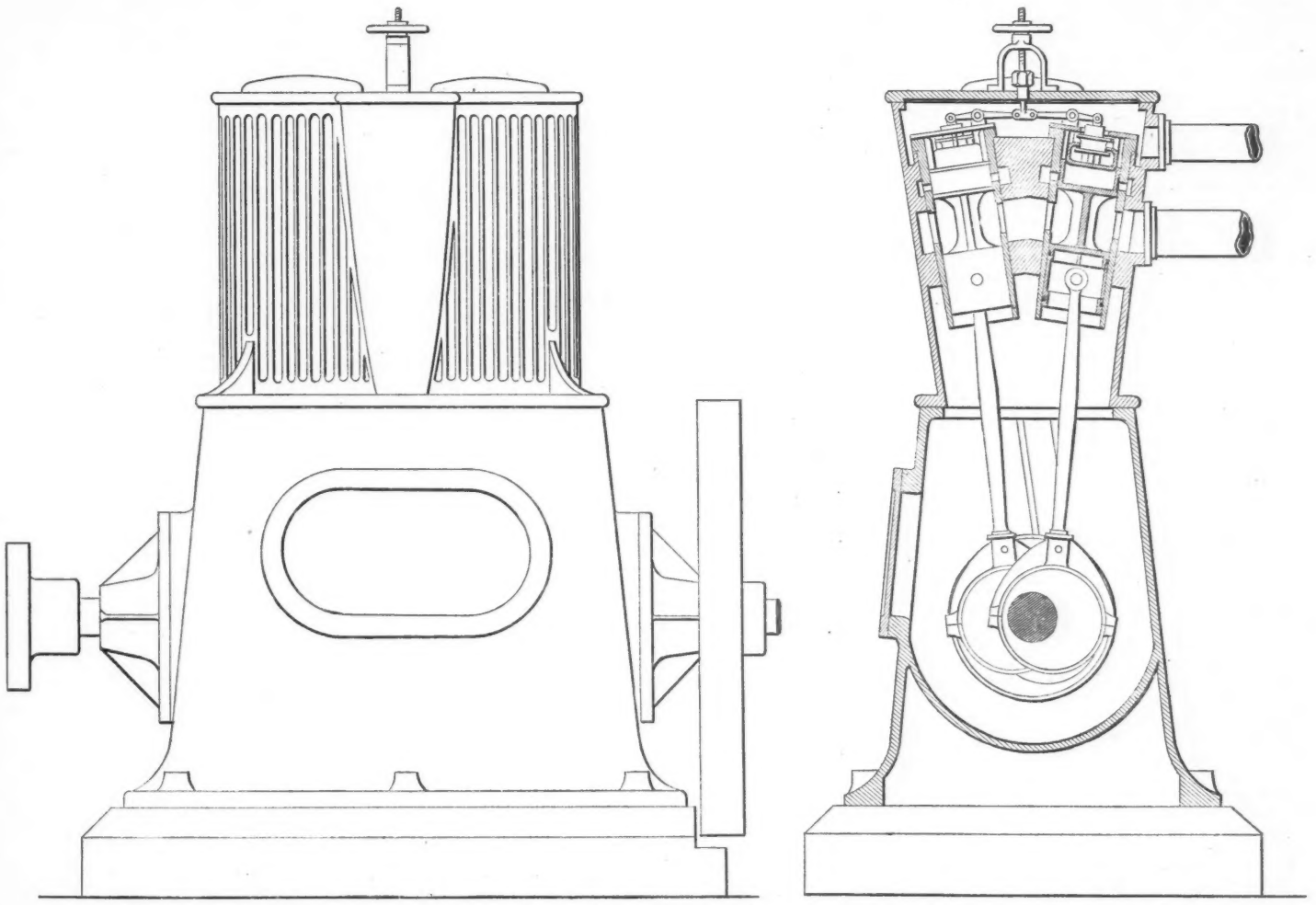
In our last issue, we gave cuts and description of a horizontal engine fitted with this new cut-off valve, as made by the Hendey & Meyer Engineering Company, of Denver, Colo. This week, we show its application to that class known as the single-acting trunk piston engine. It is, however, equally applicable to beam and inverted cylinder engines.

The engine has two single-acting cylinders with trunk pistons attached directly to two cranks set opposite each other, and between the cylinders are two valve-chambers placed at a slight angle to the vertical line, and arranged one for each cylinder, with piston-valves actuated by separate eccentrics. It will thus be seen that the action is precisely the same as with the horizontal type, the only difference in the arrangement being that the patent valves are placed above the main valves instead of below, the steam for the lower seating being supplied from above through the valve itself.

This type of engine appears to be specially applicable for direct attachment to centrifugal pumps and dynamos for high speeds, and it is thus represented in the cuts, having an arrangement for the regulation of the cut-off by hand; but for automatic regulation of speed, a governor can be applied, if desired.

There seems to be no limit to the speed at which this engine may be run. The working parts are always kept one way by the pressure of the steam, so that there is no possibility of "knocking."

The advantages of this cut-off were fully set forth in our previous article, to which we refer our readers. We consider this to be an important and valuable invention in connection with the steam-engine.



MAN'S AUTOMATIC CUT-OFF VALVE APPLIED TO SINGLE-ACTING TRUNK PISTON ENGINES.

Bessemer Steel Statistics.—We have progressed sufficiently far in the collection of Bessemer steel statistics, says the *Bulletin* of the Iron and Steel Association, to ascertain that the production of Bessemer steel ingots last year was only about 116,000 net tons under that of 1883, when 1,654,627 net tons were produced, and the production of Bessemer steel rails was only about 170,000 net tons less than in 1883, when 1,286,554 tons were rolled.

Austrian Middlemen at Odds with Political Economy.—Austrian railroad men have a system of co-operative stores, where they can supply themselves with food and other necessaries of life at considerably less than the ordinary retail prices. This does not please the regular shopkeepers, who, at a recent meeting, resolved to memorialize the government, asking that a law should be passed limiting the proportion of goods that a man should be allowed to purchase in this way to, say, one third of his salary. Shopkeepers, at this rate, will have to go to real work, for it is hardly likely the government will interfere in such a matter.

ANCIENT AND MODERN ENGINEERING AND ARCHITECTURE.*

Dr. R. Wood Brown.

The remark, "there is nothing new under the sun," is more axiomatic than the casual reader believes. We think this is a progressive age and that our generation stands pre-eminent in civilization—is the highest known. This is so, but to state that we, in this age, are immeasurably superior to the ancients is, we think, incorrect. Our aim is not to prove our century inferior to the past ones; rather, it is to present historical facts that will indicate that modern architectural and engineering works are merely reproductions of those of the ancients, though sometimes larger and more speedily erected, owing to better facilities.

The works of long ago compare very favorably with those of the present, and in some instances excel any thing of our own time. Hardening copper for tools is one of the lost arts; we can not manufacture the Damascus blade, nor do we know by what means the pyramids were erected. There are very few (if any) streets like one in Cordova founded 152 B.C. It was perfectly straight, ten miles long, and illuminated by public lamps. Paris, which is said to be the best lighted city in the world, can not surpass this wonderful street. Cordova was not without rivals. Granada, founded before Augustus; Seville in its prime 590 B.C.; Toledo taken by Maximus Flavius 193 B.C., vied with Cordova with its 200,000 houses and 1,000,000 inhabitants. This city of Cordova may not be a fair comparison, as its decay began when conquered by Ferdinand III. of Castile in A.D. 1236. Modern cities surpass the ancient in number rather than in magnificence.

A slight acquaintance with archæology is sufficient to show us that the statue of Liberty Enlightening the World is a duplicate in principle of the Colossus of Rhodes. The former is to be erected upon Bedloe's Island in New York Harbor, in honor of fraternity between France and the United States. It is of copper, and the ascent to the head is made by inner staircases. The right arm is extended, grasping a torch that will illumine the harbor by electricity. The total hight is 328 feet 11 inches, pedestal 177 feet 9 inches, leaving 151 feet 2 inches for the statue. This work of art was fabricated in France under the supervision of its projector, Bartholdi, who, in all probability, took his idea from the Colossus of Rhodes, which was also erected upon an island, Rhodes, in the Mediterranean Sea, twenty miles from Lycia, on the south coast of Asia. This Colossus was of brass, and erected 300 B.C. in honor of Apollo. Historians tell us that the hight was 125 feet, "with legs distended on two moles that formed the entrance of the harbor," said moles supposed to have been twenty feet apart, and ships sailed under the body on entering the port. The statue was hollow, and the legs were lined with large stones to counterbalance the weight. This Colossus was the workmanship of Chares, a pupil of Lysippus, a celebrated sculptor of Greece. The Colossus of Rhodes was thrown down by an earthquake sixty years after erection. The brass made 900 camel-loads, or 720,000 pounds.

The Washington Monument is considered a grand work, but the work

* From the *Kansas City Review of Science and Industry*, February, 1885.

of putting a new foundation under the old one was far more wonderful than the building of the obelisk itself. This monument presents a smooth exterior and is 555 feet in hight; was begun more than thirty-six years ago, and finished under Col. Thomas Lincoln Casey, chief-engineer and architect, December 6th, 1884. This pile of stone is hollow, and capped by marble with a conical apex of aluminium. The Pharos of Alexandria was 450 feet high, and built upon an island. Alexander the Great gave his order for this structure 332 B.C. to a Macedonian architect, Dinocrates by name, who also connected the island with the mainland by an earth wall. This light-house differed from the Washington Monument in being highly ornamented; the stone was finely carved, columns and balustrades worked in the finest marble embellished the exterior. It was built in several stories, tapering toward the top. The ground floor and the next two were hexagonal; the next square, with towers at each corner; the fifth to the top was round, with an external winding staircase. The extreme top was open, so that sailors could see its night beacons. The Pharos at Alexandria was a work of art, a credit to Alexander who began it, and to Ptolemy Philadelphus who finished it. The Americans have built the highest structure known to man, but it is barren of all art. There is quite a difference between building a light-house with carved marble on an island, and erecting huge stones, perfectly smooth, by machinery, inland, even to the hight of 555 feet.

Both ancient and modern engineers and architects considered hight as a great objective point. The Great Pyramid is 478 feet. Cologne Cathedral is 510 feet; Rouen Cathedral, 490 feet. The statue of San Carlo Borromeo, erected in 1697, was 66 feet high and the pedestal 40 feet. A marble statue of Nero was said to be 120 feet high. The walls of Babylon were 378 feet high, also 93 feet 4 inches thick and in compass 60 miles. Herodotus, who was at Babylon, gives these figures; others give the hight 50 feet, as they were after the time of Darius Hystaspes, who pulled them down to that hight, that he might conquer the city again more easily, if necessary. The Chinese wall was much longer, being 1250 miles, but very much inferior in width and hight; only 20 feet high, 25 feet wide at the base and 15 feet at the top; about one third of the wall of China is dirt and rubbish, the rest being masonry, and it dates back to 220 B.C.

The Hanging Gardens of Babylon were built by Nebuchadnezzar, to gratify his wife Amyitis. The gardens were over 400 feet square, built terrace above terrace until they were 27 feet higher than the walls, or 400 feet. The top was sustained by a series of arches one above the other, and each terrace was bound by a solid wall 22 feet thick. On the top arches, were first laid flat stones 16 feet by 4; over these, weeds and bitumen; then two rows of cemented brick covered by sheet-lead, upon which was laid earth sufficiently thick to nourish large trees. The gardens were filled with the blooming plants and shrubs that were admired by Queen Amyitis in her native Media. The different terraces and groves contained fountains, parterres, seats, and banqueting-rooms; in fact, all the splendor and magnificence of Eastern art seem to have been lavished upon these gardens by King Nebuchadnezzar, in order that his Median bride should be happy in her new home. Pen can not picture the grandeur of the conception or the perfection of the execution of these gardens, which have been and are the wonder of all ages. The greatest hanging structure now in existence is the Brooklyn suspension bridge, costing $15,000,000. The whole length is 3475 feet, and it connects New York and Brooklyn by a clear span of 1595 feet. It is 135 feet above low-water mark and 85 feet broad; it has also two platforms, one above the other. The piers are stone masonry, hollow and sunk below the surface by means of caissons. As the details of this work are formidable, it is sufficient to say that it is the greatest engineering feat known. John A. Roebling was the engineer.

One of the mysteries handed down to us is the manner in which the ancients manipulated immense stones. Take the obelisk of Luxor, which stands sentinel over the Place de la Concorde, in Paris, seventy-three feet in length. Long-continued manual labor could quarry it, but by what means it was conveyed to Luxor is still hypothetical; and the stones of the Pyramids, not one of which is less than thirty feet long by five thick, how could they be hoisted 478 feet, or rather, how were these great blocks of granite transported from the quarry at Syene to the delta of the Nile, a land journey of 600 or a voyage of 700 miles? Egyptologists have surmised many ways by which the Pyramids were built, but none of them seems satisfactory. No representations of derricks or hoisting-machines have been bequeathed to us. Some writers say that the stones were raised by machines from step to step; others tell us that skids were used; still others, that the external covering was laid from the top to bottom. The great Pyramid Cheops covers at base about 550,000 square feet and rears itself 478 feet. The first step is nearly four feet eight inches high, the top one one foot eight inches. Mathematics were known in that day, as its angle was perfect at all sides 51° 50′, also each stone was accurately fitted to another. Notwithstanding the difficulty in finishing granite, the stones of this royal tomb were finely polished. Chronologists differ as to the date of the reign of Cheops, the latest date given being 2123 B.C. Herodotus says that he "was informed by the priests of Memphis that the Great Pyramid was built by Cheops, that 100,000 men were twenty years in building it, and that the body of the king was placed in a room in the bottom of the Pyramid." No king ever had a mausoleum so beautifully magnificent; beautiful in its simplicity, magnificent in its proportions. The Pyramid of Chephren is 684 feet square and 456 feet high. The Pyramid of Mycerinus is 330 feet at base and 174 feet high.

We have never felt the feebleness of our descriptive powers so keenly as in the preparation of this paper. We have seen some of the works of the past, and their impressions can never be obliterated from our mind. We have seen the magnificent Cathedral in Milan, have seen the sun's rays reflected from its white marble, towering up 358 feet; we have watched day after day the light and shadow creep over its 10,000 statues, 1500 bas-reliefs, and 136 spires. We have wandered over its variegated marble floor 486 feet long and 288 feet wide, and have climbed wearily to the top; yet we have no power of description—no delineation can convey our ideas adequate to the effect in viewing this stupendous church, begun in 1387, March 15th, and yet unfinished, costing so far $110,000,000. The Temple of Diana, at Ephesus, has been graphically described by archæologists, and we can not do better than to gather bits of their brilliant pen pictures. The original object of worship in Ephesus was a small statue of Diana made of ebony, and said in those days to have been sent down from heaven by Jupiter. A temple was erected to contain this image, and completed during the reign of Servius Tullius, 570 B.C. This temple was said to have been destroyed by fire. A second one was begun about 540 B.C., exceeding the first in splendor, and this was partially burned on the day Socrates drank the hemlock, 400 B.C. After having been restored with greater grandeur, it was again partially burned 356 B.C., on the night Alexander the Great was born. Materials saved were sold, women gave up their jewelry, and contributions were sent from all parts of Asia, amounting to an immense treasure, and thus the Temple of Diana was restored in all its magnificence. Pliny says "that to secure the foundations of the conduits and sewers that were to support this structure, there were laid beds of charcoal, well rammed; over them wool; and then 220 years elapsed before this grand temple was completed." It was 425 feet in length and 220 in breadth, supported by 127 marble Ionic columns sixty feet high, of which thirty-six were richly sculptured and the rest highly polished. Each column was the gift of a king. The building and courts were encompassed with strong walls; there was a court on each side of the temple, which was built upon a series of narrow arches one within another. The site being a morass, the foundations were said to have cost more than the superstructure. This magnificent work of art is no more; but if we should visit Constantinople, we may find the Church of St. Sophia raised upon some of these columns given by kings to the goddess Diana. Justinian also filled Byzantium with statues from Ephesus.

One thing the ancients did not attempt; at least, there is no record of their building self-supporting domes prior to the Church of St. Sophia, in Constantinople, originally built by Constantine, destroyed by fire, and rebuilt by Justinian. The dome is 175 feet high. St. Paul's, London, begun in 1675 and finished in 1710, has a dome 145 feet in diameter, and 365 feet from the ground. St. Peter's has the largest and highest dome known. This beautiful pile was commenced in A.D. 1450, and finished three and a half centuries after. The dome is 405 feet from the pavement and 193 feet in diameter. The domes of the churches of St. Genevieve and Invalides, Paris, are also self-supporting.

Not even Dinocrates, who built Alexandria and the Pharos, also the Temple of Diana, attempted the difficult engineering feat of self-supporting domes. In constructing the Pyramids, mathematics were known, consequently it was not ignorance that prevented the ancients from worshiping under a self-supporting vault.

The sewers of Paris are great works of skill, large enough to float inspection-boats, but they do not surpass very much the Maxima Cloaca of Rome, thirteen feet broad and thirteen feet high, built by Tarquinius Priscus, 616 B.C. Athens had sewers that drained into the Saronican gulf. Babylonian sewers drained the marshes into the Euphrates. Modern times have simply copied from the ancient. The principle is the same now as when the Alexandrian architect wished to build a temple to Arsinoë, in which he intended to suspend her statue by means of a lodestone. The only thing modern sanitation can claim over the ancient is sewers greater in length and number, owing to the greater needs.

Of aqueducts, the Croton of New York claims the honor of being the finest of our age. It is forty-two miles long and thirty-three from Croton Lake to Harlem River. Lisbon aqueduct is twelve miles long; the one that carries water to Paris 110 miles. Ancient Rome had fourteen aqueducts. Three of these supply modern Rome—Aqua Virgo, about eleven and a half miles, built by Agrippa, to supply his baths; Aqua Claudia, forty-five miles long; and Aqua Trajana, twenty-three miles, built to supply inland basins for spectacular sea-fights. Constantinople had its aqueduct of Pyrgos, fifteen miles long. The aqueduct supplying Athens had perpendicular pipes of clay or lead every 240 feet or so, leading up to the surface; by this contrivance light and air were admitted to the water. Eupalinus tunneled through a hill at Samos eight feet high, eight feet broad, and four thousand two hundred feet long, with an accurately reckoned declivity; also a channel at the bottom, three feet square, to carry the water, which was thereby aërated. Duplication of tunneling on a greater scale is found in Mont Cenis, eight miles long, double tracks. It is twenty-five feet wide at the base and twenty-four feet high. St. Gothard is nine and a half miles long. Hoosac is 25,040 feet, and Sutro 3 84 miles long. The last clearly parallels the Samos tunnel, being used to carry water from a mine. Some writers say that the Euphrates was tunneled under, but the statement is vague and bears no authenticity.

The reservoirs of the ancients were not inferior to those of the present time. The expertness of the ancient engineers is attested by the remains extant; they certainly are not buried in the waters of the Lethe. The Pools of Solomon continue to furnish water to Jerusalem. They are three in number. The upper is 160 feet above the middle one; the latter, 248 feet above the lower. The first was supplied by pipes from springs, and, when full, emptied into the second, and that into the lower one The water was used for irrigating Solomon's gardens and supplying his temple. The lower pool held about 31,442,425 gallons, the middle about 12,289,912, and the upper one contained 13,778,772—a grand total of 58,511.109 gallons, or nearly six times as much as the Kansas City reservoir, which is estimated at 10,000,000 gallons. These pools were solid rock and masonry, lined with cement, and had steps leading to the bottom. One historian says that Nebuchadnezzar, wishing to brick the bottom of the Euphrates, which flowed through the center of Babylon, caused a reservoir forty miles square to be dug so as to allow his masons a dry river-bed. Another historian writes that Nitocris, a daughter of Nebuchadnezzar, is said to have dug a reservoir 420 stadia in circumference, lined with stone, for the waters of the Euphrates, in order that the river-bed at Babylon should be dry so that she could build piers for a bridge. A stadium being 625 feet, it would make this circumference forty miles. These two reservoirs may be the same, and this shows what discrepancies there are among writers.

The melting snows from the Armenian mountains sometimes caused an overflow of the Euphrates, whereby the city of Babylon and the country surrounding suffered from inundations. It was therefore necessary to drain the country; and to prevent any future trouble, two canals were cut west from Borsippa to the river Tigris, which makes these canals about seventy-five miles long. Ancient Greek authors attribute this work to the ruler who made the greatest city of ancient times and one never excelled in any age—Nebuchadnezzar. There are many canals now

of modern engineering, but few, if any, constructed to drain and to receive waters from overflowing rivers. The longest canal is the Erie, in New York State, 350½ miles long and 70 feet wide, finished in 1862. The largest canal is the Suez, authorized by Said Pasha in 1854, built by M. Ferdinand de Lesseps, and finished, or rather, officially opened, in 1871. It is 100 miles long, of which 25 miles are lakes. Its width varies from 325 to 197 feet at the top, and is about 70 feet wide at the bottom; the depth varies from 30 to 85 feet. The Erie Canal entire cost nearly $46,000,000, while the capital stock of the Suez Company was $60,000,000. The United States leads all other nations in number of canals—forty-four altogether.

PUMPING MACHINERY.—III.*

By E. D. Leavitt, Jr., Cambridgeport, Mass.

DIRECT-ACTING STEAM-PUMPS.

Mr. Worthington and his successors have supplied 214 separate water-works with 242 engines, having an aggregate daily capacity of 910,000,000 gallons. This is equivalent to upward of 40 per cent of the estimated capacity of all the water-works pumping-engines in America. The duplex engines have been made of capacities varying from 500,000 to 25,000,000 gallons a day. Their action is so smooth and perfect as to excite the admiration of all beholders. Briefly described, the Worthington duplex, as constructed for water-works, consists of two horizontal tandem, compound engines; each of which is connected to a double-acting water-plunger, by a continuation of the high-pressure piston-rod. The high-pressure cylinder is usually secured to the front head of the low pressure; the latter having two piston-rods passing through long, sleeved stuffing-boxes outside the high pressure, and keyed to a cross-head, which has also the high-pressure piston and plunger-rod secured to it. The steam and water ends of the machine are connected by turned wrought-iron cradle bars, as they are termed, which make a light and strong connection. From the cross-head, suitable links operate bell-cranks, which work two single-acting vertical air-pumps for each engine. These bell-cranks also give motion to the steam-distribution valves, which are slides working over double ports; and the valve for one side (as it is termed), or one engine, strictly speaking, is worked by the bell-crank of the other, which enables an almost constant flow of water to be maintained in the discharge-pipe. The water-valves are simple rubber disks working over brass gratings, and closed by weights or springs. Mr. Worthington is entitled to the credit of having introduced multiple valves for pumps. The later duplex engines are provided with cut-off valves, independent of the main slides.

While it is not claimed that the Worthington engines are capable of developing the highest duty, their yearly records are excellent, ranging from 50,000,000 to 65,000,000 duty; and trial duties as high as 77,000,000 have been reported. It is claimed for these engines that their moderate first cost, both as regards engine proper, foundations, and buildings, makes them in the majority of instances the most economical plant to put down; and some comparisons will be given later that justify this claim.

Among other uses to which the Worthington duplex has been applied with marked success, may be mentioned their oil line pumps, which force petroleum, under pressure of 1500 pounds per square inch, from the oil regions of Pennsylvania to tide-water. A number of these engines working up to 400 horse-power are in use for this purpose. They are also largely used for maintaining the pressure in hydraulic accumulators in use in the various steel-works of this country.

Mr. George F. Blake, of Boston, and the late Hon. L. J. Knowles, of Worcester, Mass., were early in the field as inventors and improvers of direct-acting pumps, which have been used with decided success for a variety of purposes, thousands being annually manufactured and sold. These pumps are usually single-cylinder steam-ends and piston pump-ends; though, since the expiration of Mr. Worthington's patents, the George F. Blake Manufacturing Company, and several other builders, have built a few compound duplex pumps.

ECONOMY AND DUTY OF PUMPING MACHINERY.

It has been the custom in America, and particularly in the United States, to have expert duty trials, conducted by engineers of acknowledged reputation, whenever new engines were erected at prominent water-works. From a number of reports of such trials, I have selected the following as of leading interest.

A Cornish engine that was tested at Jersey City, N. J., in 1857, developed a duty of 62,823,300 foot-pounds per 100 pounds of coal. In 1860, a rotative engine in Brooklyn developed a duty of 60.140,700 foot-pounds per 100 pounds of coal. For several years, a duty of 60,000,000 was rarely exceeded; and it was not until 1873 that a duty approaching that recorded for the trials of the Simpson compound engines in the London Water-Works was obtained. In July of that year, a board, consisting of John C. Hoadly, James B. Francis, and W. E. Worthen, tested the Simpson compound engine, built by Henry G. Morris, of Philadelphia, at the Lowell Water-Works, and obtained a duty of 93,002,272 foot-pounds per 100 pounds of coal. This trial was of 57 hours' duration. In December of the same year, a board, consisting of William E. Worthen, John C. Hoadly, J. P. Kirkwood, Charles Hermany, and Joseph P. Davis, tested the compound pumping-engine at Lynn, Mass., built by I. P. Morris & Co., of Philadelphia, and obtained a duty of 103,923,215 foot-pounds for every 100 pounds of coal fed to the furnaces. This trial was of 52 hours' duration: and the experts, in making their report to the Lynn water commissioners, said: "The duty given by your engine is, so far as we are aware, the highest that has ever been obtained by trial test of any pumping-engine in this country."

In May, 1875, a board, consisting of William E. Worthen, Thomas J. Whitman, and Charles Hermany, tested the Simpson compound engines at the Milwaukee Water-Works, and obtained a duty of 76,955,720 foot-pounds per 100 pounds of coal. In May, 1876, a board, consisting of William E. Worthen, John C. Hoadly, and Joseph P. Davis, tested the compound engines built by I. P. Morris & Co., of Philadelphia, for the Lawrence (Mass.) Water-Works, and obtained a duty of 96,186,979 foot-pounds per 100 pounds of coal with one of the engines running singly, and of 98,261,700 foot-pounds for both engines running coupled: the coal per indicated horse-power per hour was found to be 1·684 pounds. The duration of the trial of the single engine was 57 hours: and of the engines running coupled, 34 hours. It was found that the work done in pumps was 81 per cent of the indicated power of the steam-cylinders. Subsequently, in July, 1879, Mr. R. H. Buel, connected with Park Benjamin's Scientific Expert Office in New York City, made a trial of one of the Lawrence pumping-engines, and obtained a duty of 111,548,925 foot-pounds per 100 pounds of coal; all the coal fed to the furnaces, including the wood used for starting fire, being charged to the trial. Previous to this trial, annular, rubber-faced pump-valves had been substituted for double-beat valves; and the efficiency of the pump was found to be 91·64 per cent of the indicated power in the steam-cylinders. The coal per indicated horse-power per hour was 1·63 pounds; and the feed water per indicated horse-power per hour, 16·48 pounds. In October, 1878, a board, consisting of Walter H. Sears and Isaac N. Scott, tested the Corliss pumping-engine at Pawtucket, R. I., and obtained a duty of 104,357,654 foot-pounds per 100 pounds of coal, on the total coal consumed, including the wood used to start fires (estimated at 40 per cent its weight in coal). This trial extended over a period of two weeks, the running time being 10 hours a day. The same parties made a continuous test of twenty-four hours, with the same engine, and report a duty of 133,522,060 foot-pounds per 100 pounds of coal. A full description of the Pawtucket engine may be found on p. 189, Vol. XXVIII., *Engineering*. The pumping-engines at Lawrence were fully described in *Engineering*, Vol. XXIX., pp. 18 and 19. In April, 1877, Messrs. Moses Lane, Charles H. Haswell, and Henry Warrington tested the Simpson compound engines at the West Side Water-Works, Chicago, built by the Quintard Iron-Works of New York, and obtained a duty of 96,066,800 foot-pounds per 100 pounds of coal.

In May, 1882, Mr. Samuel M. Gray, city engineer of Providence, made a six days' test of the Corliss engines at the Pettaconset Water-Works, in Providence, and obtained a duty of 113,271,000 foot-pounds per 100 pounds of coal, reckoned on the coal consumed, including the wood used in starting fires (estimated at 40 per cent its weight in coal). The average running time for the 6 days was 12 hours, 27½ minutes. Deducting the coal used for starting and banking fires, Mr. Gray estimated the duty at 138,035,000 foot-pounds per 100 pounds of coal consumed in running time.

In June, 1883, Mr. Charles T. Porter made a test of the Gaskill compound pumping-engine, at Saratoga Springs, N. Y. This test was of 68 hours' duration, and the duty was reported at 106,838,000 foot-pounds for each 100 pounds of coal consumed during the trial. Mr. Porter also reports that, for the first 20 hours, the apparent duty was 117,580,000 foot-pounds; and, for the first 12 hours, an apparent duty of 127,170,000 foot-pounds. These results have been seriously questioned by many eminent engineers, on the ground that the conditions obtaining would render so high a duty impracticable. The writer, while possessing the utmost confidence in Mr. Porter's ability and integrity, can not but feel that there is a mistake somewhere, as the performance too far exceeds that of any test reported, made under similar conditions.

It may not be amiss, in concluding this paper, to sketch rapidly the leading improvements made in pumping machinery during the past forty years, and to summarize the characteristics of the best.

The most important improvement in heavy steam pumping machinery has been in compounding, which has conduced to both economy of fuel and smoothness of action, and has reduced to a very great extent wear and tear. In the pumps, the substitution of multiple valves for the enormous clacks, and double, treble, or four beat-valves formerly used, has proved of very great advantage. Improvement in design in the direction of making the parts of greater strength and massiveness, as well as more accessible for examination and repair, has been decided. Automatic valve-gears, controlled by a governor, are now largely adopted. High-pressure steam and high grades of expansion came in, as a matter of course, with compounding. Mr. Corliss, in his practice, has reached from 125 to 130 pounds boiler-pressure, expanded 20 times; while, in the new Louisville engine, it is proposed to work under 140 to 150 pounds.

By far the most important improvement has been in the introduction of direct-acting steam-pumps, either simple or compound. They are an established article of manufacture, kept in stock, and made with interchangeable parts, to standard jigs and templets. Their economy of first cost and portability strongly commend them for general use.

For small water-works, and for large works where the cost of fuel is not too great, the compound Worthington duplex engine possesses very great advantages, owing to its small first cost and good average running economy. Including foundations and structures, these engines cost less than half that of first-class compound beam and fly-wheel engines of equal capacity. In fact, at the Boston sewage-works, their cost, as estimated by the writer, does not exceed 40 per cent; and, with cheap coal, the saving by the high-duty fly-wheel engine will barely pay interest on its extra cost. At the Lowell Water-Works, there is a Simpson compound engine, which would probably cost $75,000 to duplicate at the present time. By its side stands a Worthington duplex, whose cost at present prices would not exceed $25,000. The duty of the Simpson engine for 1883, on the total coal consumed, was in round numbers 78,000,000, and of the duplex engine 61,000,000. The Worthington engine would have required 198 tons more coal to have done the work actually credited to the compound fly-wheel engine, which would cost, at $5 per ton, $990, which is 1·9 per cent interest on the $50,000 extra cost of the fly-wheel engine. It is fair to state that the beam and fly-wheel engine was not working up to its full capacity, though rather above one half the same. Doubling the work done would require 396 tons more coal—worth $1980—for the duplex engine, which is equal to about 3·8 per cent on the extra cost of the fly-wheel engine.

A more important comparison is afforded by the West Side Water-Works, at Chicago, which have cost, including machinery, buildings, and foundations, not far from $650,000. A duplex plant of the same capacity could easily be supplied complete for $300,000. The cost of fuel per million gallons, pumped at the West Side works in 1882, was $1.90; the amount pumped being 10,000,000,000 gallons, with two engines. The four engines can pump 20,000,000,000 gallons, which at $1.90 per million would cost $38,000. To pump this quantity of water with duplex engines would require not exceeding one third more fuel, costing $12,667.67,

* A paper read at the Montreal Meeting of the British Association.

which is equal to 3·62 per cent interest on the extra actual cost of the plant in use. In the selection of cases for comparison, plants which are acknowledged to be first class have been chosen.

From what has been said, it will be seen that "high duty" may cost too much. Its value must be predicated on the saving of fuel, as balanced by the interest and depreciation account of the extra expenditure for plant. If the saving tips the scale, high duty is a good investment; otherwise. not.

The most successful examples of high-duty pumping-engines, commercially considered, that have come under the writer's notice, are those at Pawtucket and Providence, R. I., and Lynn, Mass.; in all of which instances, comparatively small engines, of moderate first cost, are made to do a large amount of work, by means of high-pressure steam and high piston speed. The key to established success appears to be the adoption of these twin adjuncts to economy.

GOLD PRODUCT OF QUEENSLAND.

From a correspondence in the London *Mining Journal*, we take the following information concerning this productive field. There, as with us, the placers appear to be declining in yield, and the more permanent quartz mining does not compensate in output. The production of gold is becoming less, and the value of the gold is increasing the world over.

The following return of gold exported from the colony from 1863 to 1882 shows a marked decrease of late years in the quantity exported, and this decrease is not accounted for by local manufactures in gold having so greatly increased, and therefore, less of the metal having been exported, but by an actual decrease in the quantity of gold extracted from the earth.

That this decrease is the result of the working out of alluvial fields that at one time yielded a very large proportion of the total output of gold in the colony is indeed shown by the fact that in 1882 the total yield of gold in the colony was 224,893 ounces, being a decrease on the previous year of 46,063 ounces, the principal falling off being, among other places, at the Palmer, at one time the great alluvial gold-field of the colony, and which stands highest on the list for the total value of the metal taken from its mines. Gold exported from the colony of Queensland:

	Ozs	Dwts	Value.		Ozs.	Dwts.	Value.
1863.....	3,936	14	£14 802	1877.....	353,266	0	£1,307,084
1872.	186,019	10	660,396	1878.....	283,592	0	1,052,490
1873	194,895	6	717,540	1879.....	281,552	0	1,023,237
1874.....	375,586	10	1,356,071	1880.....	228,120	0	820,643
1875.....	391,515	0	1,498,433	1881	259,782	0	925,012
1876	374,776	0	1,427,929	1882.....	230,090	0	829,655

It is estimated that the Charters Towers gold-field, where quartz mining solely is carried on, and the adjacent fields at the Cape and Broughton River have produced gold to the total value of not less than £4,000,000 sterling. At Ravenswood, once an alluvial field, but now a quartz gold mining district, not far from Charters Towers, over £1,000,000 worth of gold has been produced, and about the same value of gold has been taken from the Hodgkinson field, south of the Palmer. Within the past ten years, it is estimated that altogether between £14,000,000 and £15,000,000 worth of gold has been extracted in the colony and exported, and to this must be added a percentage for what may be termed local consumption. The following table from the annual report of the Department of Mines, Queensland, for the year 1883 may be of interest:

	Ozs.
Northern Division.....	134,321
Central Division	12,972
Southern Division	65,494
	212,787

AVERAGE YIELD OF GOLD PER TON, 1883.

	Ozs.	Dwt.	Grs.		Ozs.	Dwt.	Grs.
Palmer	1	1	14	Ravenswood.....	0	15	3
Hodgkinson.....	0	17	22	Clermont.....	0	10	1
Mulgrave	1	14	14	Nebo.....	3	1	2
Etheridge.....	1	10	0	Gladstone	2	10	12
Woolgar	2	0	0	Gympie.....	1	2	7
Charters Towers.....	1	10	17	Tenningering.	1	1	0

From the same report, the highest average price given for gold in the year referred to was at the Palmer and Cloncurry, where it was £4 an ounce; the next at Clermont, £3 15s. an ounce; at Gympie and Gladstone, it was £3 10s. an ounce; at Hodgkinson and Mulgrave, £3 9s. an ounce; at Ravenswood, £3 8s. an ounce; at Charters Towers and Nebo, £3 7s. 6d. an ounce; at Rockhampton and Tenningering, £3 5s. an ounce; and at Etheridge and Woolgar, £3 an ounce.

At the end of 1883, there were 338 gold mining leases and applications in force, nearly two thirds of that number being at Gympie (116) and Charters Towers (109).

COST AND EARNINGS OF RAILROADS IN DIFFERENT COUNTRIES.

COUNTRIES.	Total cost of railroad construction to 1882.	Net receipts in 1881.	Percentage of net earnings on capital.
	(£1 = 1000)	(£1 = 1000)	
Germany.....	£444,517	£19,613	4·4
France.....	424,661	22,006	5·2
United States	1,274,071	57,450	4·5
Austria	255,139	4,219	1·7
Italy	107,131	2,274	2·1
Belgium	54,513	2,526	4·6
Holland.....	21,600	360	1·7
Switzerland	30,359	1,229	4·0
Sweden.	24,400	829	3·4
Russia	.....	8,164	...
Argentine Republic	11,377	284	2·5
India (British)	148,305	8,418	5·7
Canada	83,122	1,327	1·6
Victoria	16,255	751	4·6
Cape of Good Hope	9,275	223	2·4
United Kingdom.....	745,528	31,954	4·3

TREATMENT OF NICKEL-COBALT MATTES AT MINE LA MOTTE, MISSOURI.*

By James W. Neill, E.M.

The occurrence of minerals of nickel and cobalt at Mine La Motte is probably known to every mineralogist. I will not attempt to describe these minerals, but, before entering on my subject, will briefly mention the ores, etc., that call for metallurgical treatment and enter into the composition of our mattes. Our staple lead ore, the dressed galena, is the chief source of nickel and cobalt. It carries but a small percentage of these metals, namely from 0·2 to 0·3 per cent usually, though when much copper pyrites is contained in the gangue, the amount of nickel and cobalt may be as great as from 1·0 to 1·5 per cent. Next in importance is the "middle product" of the dressing-works, consisting of the sulphides of iron (and copper) with gangue and galena. This usually carries from 20 to 23 per cent of lead, from 0·5 to 1·0 per cent of copper, and from 2·5 to 3·5 per cent of nickel and cobalt. A larger percentage of copper always carries with it an increase of nickel and cobalt. In some few cases, from 12 to 15 per cent of copper gives from 6·5 to 8 per cent of these metals. Besides these products of the dressing-works, there is a small quantity of true nickel-cobalt ore produced, which, averaging only from 1·0 to 2·5 per cent, has, until lately, been of small importance. Through recent developments in the deeper workings, where the nickel, cobalt, and copper sulphides occur disseminated (but separate from one another) in a porous sandstone, the amount of this ore has been largely increased.

The dressed galena we roast in reverberatory furnaces (*Fortschaufelungsöfen*), treating from 6 to 8 tons per twenty-four hours, and leaving from 5 to 7 per cent of sulphur in the charge. This is then treated in the shaft-furnace with fluxes, producing lead, "first matte," and slag. The "middle product" is also roasted in the same furnaces (leaving from 8 to 10 per cent of sulphur), and is then used in part as iron-flux in the lead smelting, where it can only be employed in small quantities, lest it should raise too much the percentage of sulphur in the charge, and also give mechanical trouble from its fineness. Where these sulphides are rich in copper and nickel-cobalt, they are roasted and smelted separately, producing a rich matte.

The first matte formed, as above remarked, from lead ore with sulphides as flux, etc., carries usually from 3 to 3·5 per cent of nickel and cobalt (about 2 nickel to 1 cobalt), from 0·5 to 1 per cent of copper, and from 20 to 25 per cent of lead. After a period of exposure to the weather, which slacks it more or less thoroughly, it is broken with hammers to fist-size, and roasted in a reverberatory having a 45-foot by 12 foot hearth. This furnace produces from 4½ to 6 tons of roasted material in twenty-four hours, leaving about 5 per cent of sulphur in the charge. It burns from 4 to 6 cords of wood, and is served by from 6 to 8 men, according to the amount produced, etc.

This roasted first matte, when accumulated sufficiently, is used as iron-flux in smelting the lead ore, producing lead, "second matte," and slag. The second matte should carry, if no losses occurred, at least double the quantity of nickel and cobalt contained in the first; but experience has proved that the more thorough the roasting of the first matte, the greater the loss of nickel and cobalt in the slag; that is, the better the matte is as an iron-flux, the worse the concentration. I have found from 5 to 6 per cent of sulphur in the first matte to be the best limit. This does not make a very good flux, but the losses are smaller.

Slags from this matte-lead-smelting having shown as much as 0·7 per cent of nickel and cobalt, I made one campaign, as an experiment, on this roasted first matte alone, using acid fluxes, and expecting to produce a matte rich enough to warrant shipment. But the resulting matte, carrying from 12 to 15 per cent of nickel and cobalt and from 25 to 30 per cent of lead, was made at such expense for labor and fuel that we returned to the old method.

The second matte, carrying from 3·5 to 6·5 (usually from 5 to 6) per cent of nickel and cobalt, from 25 to 30 per cent of lead, and from 1·0 to 2 per cent of copper, is roasted in the same manner as the first mattes, but not so sharply, the roasted charge retaining from 7 to 9 per cent of sulphur. This high percentage is necessary to protect the nickel and cobalt, which, if entirely deprived of sulphur, will largely enter the slag, even though the sulphur contents of the charge be sufficient to "cover" them. Of course, in the subsequent smelting, the matte produced is high in lead. It will thus be seen that in this process the lead works against the concentration of the nickel and cobalt.

Until recently, the roasted second matte was smelted with acid fluxes (such as sandstone, old acid slags, etc.) and limestone. The resulting "third matte," after crushing and packing in barrels, was shipped to Europe. This smelting was done in the lead ore furnace, which is circular, 45 inches in diameter at tuyeres, 6 feet at charge-door, and 12 feet high. It proved too large for the purpose. The charge being very low in lead, and of the lead present very little being reduced, the lead always froze in the basin and "well," thus increasing the percentage of lead in the matte by imperfect mechanical separation. in the slag-pots. Four per cent of lead was the highest we produced from the second matte by this process. The resulting third matte usually carried from 35 to 40 per cent of lead, from 12 to 15 to 17 per cent of nickel and cobalt, and from 3 to 5 per cent of copper. The slags would average 1·25, and often 1·75 per cent of nickel and cobalt, and from 2 to 2·5 per cent of lead. The losses in the slags were large; and moreover, by shipping this matte, the lead contents (from 35 to 40 per cent) were lost, since the buyers do not pay for lead.

An attempt to concentrate this matte further by melting it in a reverberatory furnace, was made some years ago, but was not a success, the resulting (granulated) matte being higher in lead in direct proportion to the amount of iron that had been slagged off, while the slag carried 5 per cent of nickel and cobalt, and 5 per cent of lead. I am told that formerly some lead was regained from the matte, by an addition of metallic iron to the molten matte in this furnace; but I found this to be impracticable, the expense of iron, labor, and fuel being far above the value of any lead regained.

In this state of affairs, I advised the trial of arsenic as a means of separating nickel and cobalt from the lead by making speiss; and after

*A paper read at the Annual Meeting of the American Institute of Mining Engineers, February, 1885.

much discussion of arsenic ores, speiss, etc., we bought 13 tons of mispickel ore (carrying 23 per cent of arsenic) from the Canada Consolidated Gold Mine, of Marmora, Ont. With this, we smelted in the large furnace some 35 tons of a roasted matte carrying 12·5 per cent of nickel and cobalt; the furnace basin, as usual, chilled; and the resulting speiss and matte did not separate perfectly in the pots. The clean speiss regained, carried 36 per cent of nickel and cobalt and only 6 per cent of lead. The matte was still high in lead (35 per cent); but it carried 19 per cent of nickel and cobalt. The slag was unsatisfactory, carrying many shots of matte, and was all returned to the furnace. No analysis was made of it. The lead produced carried some 3 ounces of gold and 3 ounces of silver per ton. There was a large loss of arsenic in the fumes, probably carried off by the sulphur, as the gases at times looked yellowish, at times red.

This experiment, though financially not successful, proved satisfactorily that arsenic would separate the nickel and cobalt from the lead, and would prevent large losses in the slags. It showed, also, that the lead-furnace was too large. Before making further experiments, we built a smaller and more suitable furnace, 30 inches square at the tuyere-line, 48 inches at the charge-door, and 6 feet 6 inches between these points, with 18 inches depth of basin, lead-well behind, fore-hearth (or sump), three tuyeres, no jackets, sides of 9-inch fire-brick, cooled by irrigation.

For our next experiment, we bought some low-grade lead-speiss, a hand-sample of which had the following composition: Silver, 3 ounces per ton; gold, 0·04 ounce per ton; lead, 5 per cent; copper, 3 per cent; arsenic, 12·5 per cent (antimony not determined); iron, 55 per cent. With this speiss, I smelted a second matte, carrying in percentage 23 of lead, 1 of copper, 6 of sulphur, 5·28 of nickel and cobalt, and 35 of iron. As an acid flux, some of the nickel-cobalt ore previously mentioned was employed. This carried 77 silica, 2 nickel and cobalt, 2 copper, and 2 lime, per cent. The furnace worked well on this combination. After the first few shifts, the fumes of arsenic, which at first were strong, almost disappeared; the lead (or rather bullion) ran freely and remained hot throughout; the slag was much higher in silica than calculated (owing probably in part to corrosive action on the fire-brick walls), but was fair in appearance and separated nicely from matte and speiss; and these also separated well in the pots. The slag carried 1 per cent of lead (wet assay) and 0·78 per cent of nickel and cobalt. The amount of speiss made was much larger than calculated (owing to the larger percentage of antimony in the purchased speiss), and, of course, the percentage of nickel and cobalt was lower than expected, namely, 14·5 per cent, while the lead amounted to 12 and the copper to 5·8 per cent. The matte produced carried only 5·14 per cent of nickel and cobalt, 5 per cent of copper, and 13 of lead, and was thus too poor to ship (as was desired), and will be treated with the next lot. The lead produced amounted to 26 per cent of the matte used, showing that the speiss sample did not justly represent the pile. This lead carried per ton 9 ounces of silver and 0·1 ounce of gold, and netted us enough to pay all expenses of smelting and leave a decent margin. After running ten days, the brick walls of the furnace were nearly eaten through, in spite of the water; and as other work was pressing, I blew down; but we have now ordered a set of water-jackets, and expect to blow in again on their arrival.

This last experiment has conclusively proved that the old method must be abandoned, certainly, for the treatment of the second matte; whether it will not be more economical to treat the first matte also with speiss, remains for future experiment to determine. The same may be said of the "middle-product" sulphides.

Whether the nickel-cobalt speiss produced can be advantageously retreated here, either by using it again as arsenic surrogate in the blast-furnace with further first or second matte, or by concentrating in the reverberatory furnace, is also a question for future solution.

CHESAPEAKE & OHIO RAILROAD.

Mr. J. W. Hopkins, Fuel Agent of the Chesapeake & Ohio Railroad Company, sends us the following report of the total output and distribution of coal and coke received from the mines on the line of the railroad (including fuel on Lexington Division) for the month ended December 31st, 1884, in tons of 2000 pounds:

	For December.		From Jan. 1st to Dec. 31st, 1884.			
Kind of coal.	1884.	1883.	1884.	1883.	Increase.	Decrease.
Cannel	2,121	73	23,056	21,013	2,043	.....
Gas	39,282	41,869	324,473	373,371	.....	48,898
Splint and Block	26,320	8,807	154,803	103,327	51,476	.....
New River, etc	33,797	36,105	383,063	405,602	.....	22,539
Coke	11,077	6,500	81,515	100,786	.....	19,271
Total	112,597	93,354	966,910	1,004,099	53,519	90,708

	For 31 days.	
Distribution of above:	1884.	1883.
Fuel for use of company	23,923	26,002
Shipped at Huntington, on Ohio River	1,357	696
Delivered on line of Elizabethtown, Lexington & Big Sandy Railroad	18,202	3,649
Delivered on line of Chesapeake & Ohio Railroad, excepting Richmond	15,249	12,975
Delivered at Clifton Forge to Richmond & Alleghany Railroad	3,521	1,093
Delivered at Staunton to Baltimore & Ohio Railroad	.....	.....
Delivered at Waynesboro' to Shenandoah Valley Railroad	53	217
Delivered at Charlottesville to Virginia Midland Railroad	4,466	5,744
Delivered at Richmond, Fredericksburg & Potomac Junction to Richmond, Fredericksburg & Potomac Railroad	2,252	455
Delivered at Richmond for consumption, including tugs, dredges, etc.	9,130	11,382
Shipped at James River wharves	4,474	.....
Delivered at Newport News for consumption, including tugs, dredges, etc	437	908
Shipped at Newport News wharves	29,533	30,233
Totals	112,597	93,354

Russian Petroleum.—*Engineering* says that a cistern or tank steamer is building in Sweden for the Black Sea Steam Navigation Company, to carry 1500 tons of petroleum in bulk at a trip. The vessel will cost about $150,000. This steamer is to carry oils from Batoum to Odessa, where large reservoirs and a pumping station are about to be erected. The steamer will also run to Smyrna, where reservoirs to hold 10,000 tons of oil are constructing. Our American petroleum will have to adopt some such method for reducing transportation charges, if it is to hold its own against the Russian article in Southern Europe.

LARGE HOISTING-DRUMS OF THE CALUMET & HECLA COMPANY.

Mr. Charles T. Thompson, in a paper presented to the Engineers' Club of Philadelphia, gives the following description:

These drums were designed by Mr. E. D. Leavitt, Jr., of Cambridgeport, Mass., for the Calumet & Hecla Mining Company, of Michigan, and were constructed by the I. P. Morris Company, of Philadelphia. They were three in number. They are 20 feet 4½ inches in diameter, at the pitch line of rope, 8 feet 3 inches wide on face of winding surface, and 10 feet over all. They run loose on shafts of Nashua steel, 15-inch diameter. The rim of the drums is of cast-iron, and is in eight segments, held together by eighteen 1¼-inch fitted bolts for each joint. The hub is of cast-iron, 9 feet 9½ inches long, and is made in two pieces, held together by twenty 1¼-inch reamed bolts. and twenty-four 1¼-inch bolts. It is lined with Babbitt metal, which extends over the ends, so that all moving parts have a wearing surface of the material.

One of the peculiarities of these drums is, that they depend almost entirely on compression to retain their shape. The rim is held in its position to the hub, by forty-eight 2¼-inch stays, which are fastened to the hub. There are besides sixteen 1¼-inch stays, running diagonally from one edge of the drum to the opposite side of the hub, for stiffness.

The weight of the car for which this drum is intended is two tons; weight of load, two tons; weight of rope, 2½ pounds per foot; length of shaft, 4000 feet; incline, 39 degrees; dead-weight to be started by drum, 18,000 pounds.

The drum runs 20 revolutions a minute, giving a speed of skip of 1280 feet per minute. Total weight, 142,713 pounds.

Owing to the large size of these drums, the I. P. Morris Company had to arrange some way to turn them, as its pit was not wide enough. The following plan was adopted: In the erecting-shop, two small foundations of brick were built. On these, were placed two frames, on standards of cast-iron, 8 feet 6 inches high, 9 feet wide at bottom, 5 feet 6 inches wide at top, weighing 17,440 pounds each; these were suitably braced, to insure great stiffness. These were run up with sulphur, to insure a good bearing on the foundations.

On top of these, were placed adjustable pedestals, of Mr. E. D. Leavitt, Jr.'s, type, and these were run up with lead. From the frames, cast-iron girders were fastened, reaching to the wall of the building. On these girders, another girder was placed, to hold the lathe-bed. The carriage on the lathe consisted of a long, flat plate with suitable V grooves, to fit the ways of the bed; several T slots were in the carriage, to hold the tool carriages in place. There were two tools used at a time in all cases except in the finishing cuts. The side motion or feed was carried to the lathe screw directly from the shaft of the drum, by a series of bevel-wheels and shafts. On the end of the lathe-screw, was placed a clutch, to allow the throwing of the feed in or out at pleasure, also, so that in starting the cuts the carriage could be moved by hand.

The drum was driven by a small engine, with its own boiler, so as to be independent of the main boilers of the works. Power was taken from the engine by a belt to a small pulley, thence, by a system of gearing, to the large spur-wheel, before mentioned. This was fastened to the drum by means of wrought-iron yokes. A piece of wood was used between the arm of the spur-wheel and yoke on the driving side. The time required for turning and cutting thread was 200 hours. There were two tools used, one starting from the edge, and the other about the center, so that the two would run out about the same time. One cut only was taken (except in case of last drum where two were necessary) before commencing to cut the thread. The thread was a part of a circle, and the edges were rounded off. The thread was first roughed out by a round nose tool, and when nearly to a proper size, a tool of the right shape was used, to scrape out the thread. By this means, were obtained threads with scarcely a perceptible chatter mark in them.

Manufacture of Gunpowder in the Wet Way.—M. Nordenfelt has taken out a patent in France for making gunpowder as follows: The requisite quantity of sulphur is dissolved in sulphide of carbon, and this solution is then mixed with the carbon, which, instead of charcoal, as in other methods of making powder, is cotton or some other cellulose fiber, which is reduced to an impalpable powder. Finally, to this mixture is added the proper quantity of a saturated solution of saltpeter. This mixture is then evaporated and the crystallization is broken up, or it is evaporated in a vacuum. It is asserted that the process gives a more perfect incorporation of the several substances than is possible in the dry manufacture.

Carrara Marble.—About $800,000 worth of marble goes out annually from the quarries of Carrara, Italy, most of it to France. The price of marble varies according to its beauty. The first quality is priced at from $60 to $80 per square meter at the seaport. This is what is termed statuary marble. The second quality is priced at from $45 to $62, and the spotted at from $30 to $59. Then comes pure white, but not statuary marble. The price is $50 per square meter. The second quality is $35, and the third is $30. The veined marble brings, for the first quality $50, and the second quality $35. Violet-hued marble brings from $70 to $100 per square meter. These are the ordinary tariffs, and on them the profits are absurdly high before the marble leaves the quarry. In some instances, first-class statuary blocks have been rated at $12,000 each, regardless of market rates.

Steel for Underground Colliery Purposes.—A novel feature, which may lead to a large demand for steel for underground colliery purposes, has been introduced by the Darlington Forge Company, which is executing considerable orders for large sections of channel steel to be used for roof beams in the place of wood in pit workings, and steel props are also making for supporting the roofs. The first cost of steel for beams and props is, of course, in excess of the wood supports at present used; but an ultimate saving will be effected in that they can be removed for further use without damage, which to a very large extent is not the case with wood, while an additional and very important advantage is secured in that much less space is occupied as compared with the heavy timbering now required, and a better working headway in the mine is obtained.—*Iron*.

FURNACE, MILL, AND FACTORY.

Thirty licensees of the Washburn-Moen barbed wire fence patents, in session at Chicago, Ill., February 4th, appointed a committee to wait on the owners of the patents, and secure a reduction of the royalties. It is stated that the committeemen asked that the royalty of 30 cents per 100 pounds be reduced to 10 cents. Mr. Washburn offered to reduce the royalty to 15 cents. It is thought that a compromise of 12½ cents will be effected.

The Brown Hoisting and Conveying Machine Company, of Cleveland, Ohio, has recently contracted to erect a plant on the dock of the New York, Pennsylvania & Ohio Railroad Company, in Cleveland, for handling coal for the West Newton mines. The plant will consist of two truss bridges from 80 to 100 feet in length, movable along the dock front, which is 300 feet. A Brown hoisting-machine will be worked on each truss, and unload coal from the cars to the lake vessels, or, when desirable, deposit on a stock-pile on the dock. It will also load either vessels or cars from the stock-pile. The plant, although not so extensive, will be similar to that erected by the Brown Hoisting and Conveying Machine Company at Ashtabula Harbor last year for the Youghiogheny River Coal Company. Mr. Alexander E. Brown has recently patented a device for a safety-catch in connection with a grappling-hook for his hoisting and conveying machine. By means of this device, the bail of the tub or bucket is positively locked into the hook, and is released by the handler when he takes hold of the hook. Instead of adding to difficulty in handling, the lock arrangement affords a convenient handle to the hook, which really adds to the convenience in handling. C. W. Kelly, of this company, has recently returned from France, having completed and put in satisfactory working the hoisting and conveying plant for Solvay & Co., near Varangéville. Mr. Kelly reports Solvay & Co. well pleased. The handling of their coal at their works formerly cost nine cents a ton, and it required a day and a half to unload a boat. Now the handling cost is three cents a ton, and a boat is unloaded in three quarters of a day.

The demand for the Ballantine ice-machines, manufactured by the Cummer Engine Company, of Cleveland, Ohio, is such that the company is making arrangements for night work, present orders, together with its orders for engines, being sufficient to keep it busy with a full force day and night for the next three months. About forty thousand dollars' worth of new machinery has been added to the works during the past year, among which is a lathe of large dimensions for boring and facing the large wheels used in the construction of ice-machines and engines. The lathe has a revolving table with 25-foot sweep, and the uprights that hold the tools are hung on a radius by which they can be set to work at any angle, and a wheel 25 feet in diameter with five feet of face can be turned up, and handled on it with ease. The machine was manufactured expressly for the company at the Niles Tool-Works, Hamilton, Ohio, and contains 70 tons of metal.

The Fairfield Chemical Company's works at Bridgeport, Conn., have a contract for furnishing high explosives for the largest section of the new Croton Aqueduct. This heavy contract will require the trebling of the capacity of the works (now about 20,000 pounds a day), and will run over six years. The acid is all made from Virginia pyrites, which are free from arsenic. This concern furnishes the government with a 66·3 degree acid for use at the torpedo stations. This acid is made in a new patent platinum still, owned by the company, at a much lower cost for the plant than the Faure & Kessler still, or other patents in use.

The Spence desulphurizing furnace is owned by the Sulphur Mines Company of Virginia, at Louisa County, Va.

The Rensselaer Rail-Mill at Troy resumed work February 11th, after six months' idleness. The Bessemer Steel-Works at the same place have also begun operations.

The entire business property of W. S. Tyler, the well-known manufacturer of wire cloth and wire goods, at Cleveland, Ohio, has been transferred to the W. S. Tyler Wire-Works Company. This company has been incorporated under the laws of the State of Ohio, with a paid-up capital of $175,000, for the purpose of manufacturing wire cloth and wire goods. With increased capital and enlarged facilities for manufacturing, the company is in a position to fill all orders promptly and satifactorily. A handsome illustrated catalogue has been issued, giving full particulars and prices of the articles manufactured by the company.

Reports from Joliet, Ill., state that all the industries are in operation, including the wire-mills, barb-fence factories, general manufacturing establishments, and rolling-mills.

An explosion occurred February 10th, at the Central Iron and Steel-Works, at Brazil, Ind. Four men were killed, eight were dangerously wounded, and a large number of others received slight injuries.

Work was resumed February 10th in the bar and guide mills of the Allentown Rolling-Mill Company and at the Fullerton Rolling-Mill, in Allentown, Pa.

At a meeting of the manufacturers of barbed wire, held at St. Louis, Mo., last week, it was unanimously agreed to advance the price of barbed wire to 4 cents for painted and 5 cents for galvanized car lots, and ¼ cent additional for less than car lots. To make this agreement more binding, each concern represented deposited in the hands of William Edenborn, Vice-President of the Southern Wire Company, a certified check for $2500, which is to be forfeited in case any member is found to be selling wire at less than agreed rates.

Messrs. Witherow & Gordon, of Pittsburg, Pa., have almost completed the iron work for the two blast-furnaces to be erected at Dayton, Tenn.

It is stated that almost every ship of the United States and Brazilian Mail Steamship Company takes out to Brazil one or more iron bridges. They are shipped in sections, and when they reach Brazil are put up in place of wooden bridges on the Brazilian highways. Recently, two locomotives for Brazilian railroads, and large quantities of barbed wire for fencing purposes, were shipped from this port to Brazil and to Central America.

The Chattanooga (Tenn.) Foundry and Pipe-Works resumed work February 9th, after three months' suspension. The nail-works at the same place have started up, and manufacturers state that the business outlook is better now than for a year past.

A representative of the Baldwin Locomotive-Works has denied the statement, published last week, that they intended to remove their works from Philadelphia to Reading, and that property had already been purchased there for that purpose.

The rolling and plate mill of the Nashua (N. H.) Iron and Steel Company was burned February 7th. The loss is estimated at $50,000, fully insured.

A heavy assumpsit suit was begun in the Superior Court at Chicago, Ill., by Frances Brown against Herbert C. Ayer and Henry I. Higgins, President of the Chicago Mining and Smelting Company, to recover $50,000 damages. In the year 1878, the defendants purchased some stock in the Brown & Bonnell Company, and in payment gave notes aggregating $30,000. It was understood that a default made in the payment of the interest or any of the notes would render them all payable, and action is taken to compel a settlement. The notes were given to Brown, who subsequently indorsed them to his wife, the plaintiff in this suit.

The agerstown (Md.) Machine Company has been incorporated, with a capital stock of $28,000. The new company will conduct a general machine manufacturing business at the same stand as the late firm of Garver, Foltz & Co., which it absorbs, known as the Old Agricultural Works.

It is reported that Robert H. Coleman has ordered plans to be prepared for the largest and most complete iron blast-furnace in the United States. It is to have a capacity of 1000 tons a week and is to be known as the No. 3 Colebrook Furnace, and will adjoin No. 2 Colebrook Furnace at Lebanon, Pa.

LABOR AND WAGES.

Lewis A. Riley & Co.'s collieries at Ashland, Pa., have resumed work at 10 per cent reduction of wages.

The action of the Pittsburg iron manufacturers in demanding a reduction to $4 a ton in the next yearly scale of the Amalgamated Association was ratified at a meeting of the Western Iron Association, called for that purpose. The meeting was one of the largest ever held.

The Riverside Nail Mill, Wheeling, West Va., discharged puddlers, helpers, and third hands to the number of 250. All the remaining employés who are on salaries, from the manager down, were reduced 10 per cent.

The Phœnix Iron Company, of Phœnixville, Pa., has announced a reduction in wages, to take effect on and after February 23d. The puddlers will be paid $3.25 a ton, and mill and yard laborers, except common laborers, will be reduced 5 per cent.

The Dighton Furnace Company, Taunton, Mass., resumed operations February 9th, at a 10 per cent reduction of wages.

Assemblyman Hooley, of Troy, has introduced a bill imposing a penalty on employers for exacting a pledge or an oath from employés not to join or belong to any labor organization.

The Ætna Nut Company and the Southington rolling-mill at Southington, Conn., have made a reduction in wages of 10 per cent.

The five largest iron-works in San Francisco, Cal., have announced a reduction in wages. The workmen have refused to accept the reduction.

At a meeting of the Coal Trade Tribunal at Pittsburg, Pa., February 11th, the umpire, Mr. Weeks, announced that he had fixed the rate for mining in the railroad pits at two and a half cents a bushel, to date from the first of the present month. The award reduces the mining rate one half cent a bushel, the present rate being three cents. It is generally satisfactory to the operators, and will be accepted by the miners without opposition.

A Pittsburg dispatch, dated February 10th, says that it is currently reported that the Amalgamated Association has issued a circular to its members asking for an expression of their views on a sixteen per cent reduction in the scale for the coming year. All who are willing are requested to sign the circular and return it to the officers of the association before the meeting of the Scale Convention on March 4th.

RAILROAD NEWS.

The American Electric Railroad Company has been incorporated, with an authorized capital of $1,000,000. The names of the corporators are Cyrus W. Field, Edward H. Johnson, Frederick F. Thompson, Stephen D. Field, Robert E. Deyo, Edward N. Dickerson, Jr., Charles Batchelor, Francis R. Upton, and Daniel A. Lindley. It is stated that the experiment of running trains by electricity will be tried on the Second Avenue Elevated Railroad in this city, as soon as the necessary arrangements can be made. The work will be begun immediately.

The Chesapeake & Ohio Canal has fixed the canal tolls for the coming boating season at 22 cents a ton, with 4 cents wharfage, making the charges for the transportation of coal by the canal from Cumberland to Georgetown 26 cents, a reduction of 10 cents a ton from last season, when the charges were 36 cents. Under the new schedule of charges, which are the low, est ever known on the canal, the cost of the transportation of coal to tide-water will be about as follows: Expenses from the mines to Cumberland, 30 cents a ton; boating, 70 cents; tolls and wharfage, 26 cents; total, $1.26. This is a little lower than the cost by railroad which has been fixed at $1.30 a ton after the drawback has been allowed. The president of the company has been authorized to settle the claims of the Maryland and American coal companies, which have been in litigation for a number of years. The New Central Company and individual shippers will also be pressed to settle up the claims due the Canal Company.

The report of the Delaware & Hudson Canal Company for 1884, issued February 11th, shows that 3,362,679 tons of coal were produced at the mines of the company, and that 623,697 tons were transported for others. The gross receipts were $16,379,021.06, and the expenses $11,549,871.46; $4,829,149.60; less taxes, interest, and rentals, $3,341,055.53, leaving net earnings $1,488,094.07, or a fraction over 6⅝ per cent. The mining of coal was suspended for 103 days during the year. Under the policy of restriction, the surplus or dividend fund has steadily increased, the report says, notwithstanding the payment for several years of dividends of six and seven per cent per annum. The leased roads of the company have shared in the general business depression that marked the year, and show an aggregate loss of $174,489.65. Three million five hundred thousand dollars of bonds were retired during the year, and 35,000 shares of stock were added to the capital account.

The rivalry of the railroads for the control of the slate and iron freight of the upper end of Northampton

County, Pa., continues. Judge Schuyler at Easton, February 10th, decided the injunction case of the Bangor Union Slate Company *vs.* the Wind Gap & Delaware Railroad Company in favor of the latter, which is operated by the Lehigh & Lackawanna Railroad, which connects with the Lehigh & Susquehanna division of the Reading system at Bethlehem. The injunction was granted originally to restrain the Wind Gap & Delaware Railroad from extending its track over the land of the Slate Company. By the dissolution, the railroad has the right to advance 260 feet farther east. It is the second injunction decided in favor of the railroad company inside of two weeks, and settles that it has the legal right to build branches to its main line. The other injunction was obtained by Flory & Reichard, of Bangor. There is now no further obstacle in the way of the railroad, except the crossing of the Bangor & Portland Railroad, which will be hotly contested. The latter railroad has given notice that it will not permit any crossing of its tracks under any consideration.

It is rumored that arrangements are making for the completion of the Oroya & Cerro de Pasco and the Amazon railroads in South America. The Oroya & Cerro de Pasco Railroad was begun by Henry Meigs, who, besides the large amount received from the Peruvian government, spent a large sum himself in its construction. When completed, it will run from Callao to the famous silver mines of Cerro de Pasco, about 110 miles. The road runs over a rugged and mountainous country, some of the mines being at an altitude of from 10,000 to 12,000 feet. The railroad will be carried up the mountain side in a zigzag fashion.

The Sharon & State Line Railroad, which is to run through Mercer County, Pa., from Sharon, a distance of two miles, has been chartered, with a capital of $60,000.

COAL TRADE NOTES.

CANADA.

PROVINCE OF ONTARIO.

NATURAL GAS.

Natural gas has been found at Leslieville, an eastern suburb of Toronto.

COLORADO.

The Colorado Coal and Iron Company is working its new mine at Crested Butte, and keeping both old and new chutes running day and night.

INDIANA.

The Nickel Plate mine is the only shaft in the Brazil District running full-time with fair prospects ahead. The Brazil Block Coal Company has nine shafts in the district now. It has suspended work in its slope commonly known as Niblock No. 6, and will shut down the Tom shaft in a few weeks, as it is pretty well worked out. The remainder of its mines average about half-time.

KENTUCKY.

Two gas-wells have been drilled in the vicinity of Warfield.

OHIO.

At Chapman, the new shaft of Russell & Co. is opening up rapidly. Entries are working night and day. The Youngstown Coal Company has made arrangements with the land-owners to continue mining coal on the old Willow slope; and to accomplish this object, it will be necessary to sink a new opening, which will be commenced at no distant date.

There will be no postponement of the sale of the coal properties of the Ohio Central Coal Company, which is advertised for the 17th inst. Holders of bonds of the $1,000,000 issue should deposit them with the Central Trust Company this week, together with two per cent cash, or it will be impossible to bid in the property. John T. Martin, George R. Sheldon, and William W. Ingraham have been appointed a reorganization committee for the Main Line coal bondholders.

PENNSYLVANIA.

ANTHRACITE.

The air-shaft of the Delaware, Lackawanna & Western Coal Company's new Woodward colliery is down 1003 feet to the red-ash vein and through it.

The rising water in the Enterprise mines, reached the foot of the shaft on the morning of February 8th, and submerged the pumps, compelling an entire stoppage of the work of clearing the mine. The colliery was weakened by a serious break last September, and the water began pouring in through cracks in the rock between the works and those of the old slope that was filled with water some years ago. Great efforts have been made to clear out the water, and four enormous pumps costing $16,000 were put in besides the old ones, but delays and accidents have continually happened. A few days ago, several of the pumps were disabled. An attempt will now be made by putting new and rapid hoisting-engines to lower the water by hoisting in buckets sufficiently to allow the pumps to be started again. The colliery is owned by Andrew Langdon, of Buffalo.

Reports dated February 9th state that the fire in the Ebervale slope continues to burn. Gangs of men are fighting it from four different points, and are pouring continuous streams of water upon it. The fire has been extinguished on the gangway near the bottom of the second lift, where it originated.

All the collieries of the Philadelphia & Reading Company will be suspended for at least two months, except Beechwood, Eagle Hill, and Eagle collieries. It is probable that Locust Gap will be closed down for the remainder of the year. General Manager S. B. Whiting has stated that more coal will be mined this year than there was last year, but in a different and more economical way. Instead of having most of the collieries working at intervals of two weeks, a number of them will be run on full-time all the year round, and so do away with the old system of stoppages to a great extent.

BITUMINOUS.

The H. C. Frick Coke Company will soon be taking coal out of its new slope, which is sinking just north of Broad Ford, on the Mount Pleasant branch.

COKE.

There has been a marked improvement in the coke trade for the past ten days; but as yet no order has been made by the syndicate to increase the production. Sixty per cent of the ovens are now closed down, and all are idle one day in the week.

J. W. Moore has begun the erection of a plant of 300 coke-ovens in the Pleasant Unity District, where he owns an extensive tract of coal.

Forty-five new coke-ovens are to be added to the Leith Works, south of Uniontown.

Twenty per cent of the idle coke-ovens under the control of the coke syndicate are to be fired up at once on the authorization of the syndicate. Five thousand of the syndicate's ten thousand ovens are now in blast, and it is anticipated that by the first of March all will be running.

NATURAL GAS.

A bill has been filed by the city of Pittsburg against the Fuel-Gas Company and the Penn Gas Company, to enjoin the further laying of natural gas pipes within the city limits and to prevent the use of those already laid until they are adjudged to be safe; that is, of proper durability and free from leakage.

The borough of Butler has asked for an injunction restraining the Butler Natural Gas Company from furnishing gas to the citizens of Butler borough. They allege in their bill that the company had no right to lay its mains; that those it has laid are unsafe; and aver further, that the company is not responsible for any damage that may be done, as the company's property is mortgaged to the extent of $10,000. The company admits that it had no right to lay its mains; but having done so under the eyes of councils, and having been operated nearly two years, it could not be enjoined. The plaintiff's attorney conceded that they wanted gas, but wanted safe pipes laid and not third-hand material, which they allege the company is now using. The decision has been reserved.

SOUTH AMERICA.

THE ARGENTINE REPUBLIC.

A discovery of coal has been made in the Andean region of the republic, which is a point in favor of the opinion heretofore expressed by competent authorities that the entire region of the Andes slopes is underlain by coal-measures. The coal is reported to be of good quality, and the government has appointed a commission to examine the region and make tests.

WYOMING.

It is reported that, in cutting the 1400-foot tunnel of the Oregon Short Line at Twin Creek, seven seams of coal were pierced. These dip at an angle of about 40 degrees, and are 5, 7, 8, and 20 feet thick. On the west side of the tunnel, at mine No. 1, the road is taking coal from three seams respectively 5, 8, and 10 feet, and is tunneling for another seam 18 feet thick. At mine No. 2, it is extracting from a 14-foot seam. This coal burns to a white ash, is a good steaming coal, but possesses the defect of slacking badly upon exposure to the air. In mining, about one fourth is waste, because of this disposition to slack and crumble.

GENERAL MINING NEWS.

ARIZONA.

PIMA COUNTY—QUIJOTOA DISTRICT.

W. H. Patton, General Manager of the principal Quijotoa mines, who has been in Arizona, will soon go to Pittsburg, to contract for iron pipe sufficient to bring water from the well to the site of the company's mill, a distance of about five miles. The shaft sinking for water is down 156 feet, making good progress, and will be completed in about 60 days.

CALIFORNIA.

The production of almost all the quicksilver mines of the State shows a decrease, as compared with the production of previous years. Not only have most of the smaller mines been closed, but some of the larger ones as well, and it is stated that others are to follow. The price of quicksilver has been low, though it is now somewhat improved. As regards the numerous mines in Napa, Sonoma, San Luis, Obispo, and elsewhere in the State, that were forced to succumb to the accession of low prices for quicksilver, there is little chance of work being resumed upon them even with the present improved market, as much money would be required to put them in productive shape, only a few of them ever having been thoroughly opened or properly equipped. From some of them, the plant has been removed; on others, the shafts and tunnels have caved in; and it is highly probable not a few have been abandoned altogether. Little, therefore, need be expected from any of these mines, at least for the present.

INYO COUNTY.

INYO CONSOLIDATED.—A judgment of $7546 has been filed in this city against the company by F. J. Wall.

MONO COUNTY—BODIE DISTRICT.

Reports for week ended January 31st:

CONSOLIDATED PACIFIC.—During the week, the men have run into more favorable country-rock, but there is no material change to note in quality or quantity of ore. The small vein recently cut, so far as shown by the drift, contains only low-grade ore, not going over from $12 to $15 a ton.

STANDARD CONSOLIDATED.—There were extracted and shipped to the mill 509 tons of ore. Received 1870 ounces of crude bullion; and shipped to the company $25,252.01.

NEVADA COUNTY.

CORNUCOPIA & SECRET TREASURE.—The company has shipped its first bullion.

SIERRA COUNTY.

RAINBOW.—H. H. Noble, the stock broker of San Francisco, who was honorably acquitted of the charge of embezzling the funds of the Rainbow Mining Company, of which he is president, is about to bring suit for $100,000 damages against his detractors.

SIERRA BUTTES.—No. 9 tunnel at Sierra City is in 4000 feet, passing through good ore. Twenty more stamps will be added to No. 9 mill by the middle of February, making sixty in all. The pay ore is produced from Nos. 7 and 8 tunnels.

COLORADO.

In the case of Gillett *against* Senator T. M. Bowen and others, Circuit Judge D. J. Brewer, of Denver, has decided against the complaint by dismissing the bill. The suit was brought to recover 375 shares of the stock of the San Juan Consolidated Mining Company. The plaintiff held that the stock was given in trust, to secure the payment of a ten-stamp mill, which was bought from ex-Senator J. B. Chaffee. The defendants, however, held that the stock was not given in trust, but as a consideration for the mill, and so the court held. There are many side issues to the case that have been in litigation since October, 1882.

CHAFFEE COUNTY.

MADONNA.—The mine is shipping 150 tons of ore a day.

MURPHY.—Shipments are regularly made to the Grant Works, at Denver, at the rate of about five cars a day. The new cable that has been put in place on the tramway, and the new hopper, lately built, add materially to its capacity. The smelter talk has died out and may not be revived again this season. The low rates obtained for smelting and transportation have apparently caused the owners to change their mind about building.

SILENT FRIEND.—The company is working one shift in sinking its main incline. It intends to sink at least

100 feet more before spring, when it will begin shipping ore regularly.

CLEAR CREEK COUNTY.

TALISMAN.—Work has been resumed on this lode, an extension of the Boulder Nest. The adit, which is in 300 feet, will be driven an additional 50 feet. In the breast are exposed two feet of ore, the character of which is copper and iron pyrites and galena.

WINDSOR & MONTROSE.—These lodes have been leased and operations begun through the 400-foot tunnel that cuts both lodes. The workings have been placed in good condition. A streak of high-grade ore has been opened in the Windsor lode.

DOLORES COUNTY.

GRAND VIEW MINING AND SMELTING COMPANY.—The company will be ready this spring to purchase all the good ore offered, which will be treated on as good terms as by any reduction company in the camp, and pay for ore as soon as sampled for smelting.

FREMONT COUNTY.

It is reported that several gold strikes have been made on Oak Creek, about nine miles south of Cañon City. The ore is said to be mainly gray copper, and a mill run is to be made at the smelter soon.

LAKE COUNTY.

DENVER CITY.—A new shaft is sinking on this mine, between the Lee Basin and Denver City shafts.

IRON SILVER.—During the year 1884, the company shipped ore valued at $681,519.

NELLIE S.—The ore-body opened by the lessees of this mine, on Printer Boy Hill, consists of heavy red sand and dark-blue talc matter. It was encountered on January 15th, but it was kept quiet until lately. The red sand, after several assays, is said to show an average of 31 ounces of gold to the ton, or $558. The ore-body was exposed in an uprise and about twenty-five feet from the surface of the hill.

OURAY COUNTY.

NATIONAL BELLE.—The south tunnel is in about 140 feet. The first pocket or chimney of carbonate and galena ore was encountered at a point about 115 feet from the mouth of the tunnel. Shipments of ore were resumed on the first of the month.

PERICLES PLACER.—Arrangements are making for the erection of hydraulic machinery, which is now constructing in the East, and will be shipped as soon as completed.

PARK COUNTY.

EXCELSIOR.—Works for the Meech process of ore-reduction are to be erected at this mine in the spring. It is said that the owners of the patent propose to erect a plant at or near the mine, and run it for a time themselves, paying a royalty on the ore they use, and subsequently selling to the Excelsior owners, if they become satisfied of its feasibility.

PITKIN COUNTY.

SPAR CONSOLIDATED.—The company is building a road from the county road to the Enterprise tunnel, which is now in 550 feet and passes through the Betsy Jane and Millionaire claims.

SAN JUAN COUNTY.

At a meeting of miners held at Silverton, a resolution was passed and signed by all who were present, pledging themselves not to work for less than $3.50 a day.

SAN MIGUEL COUNTY.

BOOMERANG.—The tramway has made a test-run working satisfactorily. It will handle fifty tons of ore in ten hours easily. It is 1600 feet from the mine to the San Miguel River. The mine shows six feet of chlorides and other ore. Two stoping thoroughfares are now opening. A concentrator of fifty tons capacity will be erected early in the spring.

TURKEY CREEK.—The company has under advisement the scheme of enlarging the milling facilities by new and improved plans of amalgamation. The resident manager is authorized to prepare for the work as early as convenient in the spring. The properties will also be worked extensively this summer.

SUMMIT COUNTY.

WALKER.—This stamp-mill at Lincoln, above Breckenridge, is running fifteen stamps day and night, treating free gold ore that is obtained from mines near by.

DAKOTA.

LAWRENCE COUNTY.

FATHER DE SMET.—During the past year, the company milled 106,540 tons of ore of an average value of $4.45 per ton. The report of the superintendent for the week ended February 1st shows ore extracted from first, second, and third levels, 3010 tons; ore milled, 2970 tons. West cross-cut, third level, advanced 13 feet; total length, 77 feet. Finished.

GOLDEN SUMMIT.—Work has been temporarily suspended. It is expected that reduction machinery will be erected in the spring.

MEXICO.

The value of the exportations from Mexico for the fiscal year ended June 30th, 1884, is, precious metals, $33,473,283.30; other articles, $13,252,213.12; total, $46,725,496.42.

A chamber of commerce has been organized in Durango with Hilario Willmanns as President; P. Emilio Stahlknecht, Vice-President; Carlos Bracho, Secretary; and Miguel Verduzco, Treasurer.

It is reported that a company has been formed in Guadalajara for the purpose of working the gold mines situated in the sixth and tenth cantons of the State of Jalisco.

The Legislature of Nuevo Leon has decreed that quicksilver, iron, and coal mines and their products shall be exempted from all taxes, and all others shall pay a tax of one per cent on the value of the ores or other substances extracted without deduction for costs.

CONCEPCION.—It is said that the mine is in bonanza. Its owners are preparing 150 tons of rich ore as their fourth shipment to Germany. The average value of this shipment is about $250 a ton.

CUSIHUIRIACHIC.—The company hopes to get its fifty-stamp mill done in February, and soon afterward to be producing. The mines are in good condition, and many tons of ore await the completion of the mill. Work has been begun on a railroad from Chihuahua to the Santa Madre Mountains, which will pass close by Cusihuiriachic, benefiting the property greatly.

MICHIGAN.

COPPER MINES.

The output for January of the mines mentioned is as follows:

	Tons.
Calumet & Hecla	2385
Atlantic	199
Franklin	170
Quincy	161
Allouez	147
Huron	119
Hancock	35

QUINCY.—The reports of poor ground in the thirty-third level are affirmed by private advices, which say further that drifting has been stopped and the diamond drill set to work to find richer ground. The Boston office is said to have information that the vein has been found on this level. On the thirty-second level, the ore was very rich, and it is expected that it will be found equally rich on the lower level in good time.

GOLD AND SILVER MINES.

Gold and silver mining is going on in the old Holyoke silver-lead region, some eighteen miles from Ishpeming. Considerable money was expended at this point more than twenty years ago, since which time it has lain idle.

MILWAUKEE & LAKE SUPERIOR.—It is said that this company, which owns the Ontonagon and Superior silver mines, has succeeded in interesting parties with capital at command, who propose to begin active mining in the spring and keep the mill running in its full capacity and add such other machinery and reduction-works as the development of the mines will warrant.

ROPES.—A Wiswell crushing and amalgamating machine is erecting. If it works satisfactorily, the company will put in three more. If not, 25 more stamps similar to those now at work will be added early in the spring.

MICA MINES.

MARQUETTE MICA MINING COMPANY.—For the purpose of developing the mica property near Republic, this company has been organized with a capital of $500,000.

MINNESOTA.

The Bay City (Mich.) syndicate, it is said, has invested $6100 in mineral lands in this State.

MONTANA.

LEWIS & CLARKE COUNTY.

MONTANA COMPANY, LIMITED.—A report issued to the stockholders shows that the directors have arranged for the payment of Mr. Cruse's mortgage of £33,000 with interest, which falls due on February 18th. When the old board left office, the debts were £58,000. The stores now in hand are of the value of £15,000. It is desired now to issue mortgage bonds to the extent of £60,000, bearing interest at 8 per cent, of which £50,000 has been guaranteed. Great economies have been introduced into the working—the saving in labor alone being considerable. The reports as to the mine are satisfactory, the mine is improving, and the yield has increased. Mr. Atwood, the late manager, is in London, and has been examined by the committee. He complains of the unfair treatment he received from the late board, and has handed in his resignation, which has been accepted.

SILVER BOW COUNTY.

BELL.—The rich ore coming from the mine at the rate of 100 tons a day can not be handled at the smelter, and the company has been compelled to hire the old Parrot smelter's calciners. Three of the roasters and two more of the calciners have been started up.

GOLD HILL.—This mine has been bonded for $20,000 to the Gould & Curry Company, of San Francisco, for one year. The same company also has a lease on the mine for the same length of time. Work will be commenced at once, and the main shaft sunk to a depth of 200 feet.

JOSEPHINE.—This property has been bonded to the Crystal Mining Company, of San Francisco, for three months, for $50,000. The company has also leased the mine for six months, and will begin work as quickly as the machinery can be erected. The shaft is down 200 feet, and east and west levels have been run 45 and 30 feet.

MOUNTAIN VIEW.—Work is doing at present on the north vein. On the 500, a body of rich ore 17 feet wide has been struck. It averages from 26 to 50 per cent copper, and is shipped East.

NEVADA.

ELKO COUNTY—TUSCARORA DISTRICT.

NAVAJO.—The mill has shut down on account of the refusal of the mill employés to submit to the reduction of $1 per day from their present wages.

EUREKA COUNTY.

RUBY & DUNDERBERG.—The scheme by which the debenture-holders waive their principal, and the shareholders receive two shares for each one held in the present company, was unanimously agreed to at a meeting held in London, England, January 20th.

STOREY COUNTY—COMSTOCK LODE.

The Ophir, Mexican, and Union Consolidated are running a drift on the 500 level, and intend to explore a large piece of ground that was neglected years ago.

BEST & BELCHER.—At the annual meeting, held in San Francisco, it was shown that the company had 23,620 shares of stock forfeited for assessments. There was on hand on January 1st, $15,094.31, and there was due the Sutro Tunnel Company, $10,290.

CONSOLIDATED CALIFORNIA & VIRGINIA.—Some ore has been stoped out on the 1750 level. The rising of the water will not flood either the 1750 or 1950 evel of this mine, even should it rise above the 1800 at the north end. The 1200 level is producing a considerable quantity of milling ore, taken out under the Jones contract.

HALE & NORCROSS.—The west cross-cut No. 2, of the 2800 level, has passed through about 80 feet on good quartz and the prospect is said to be encouraging.

SIERRA NEVADA.—At the north end, the company expects to make a good thing from the ore-veins possessed by the company at Cedar Hill.

NEW MEXICO.

GRANT COUNTY.

The Murdock process of reducing ores is to be given a trial soon at Carlisle. The works are about completed.

SOCORRO COUNTY.

BILLINGS SMELTING-WORKS.—During the past year, these works produced bullion valued as follows: Lead at 3·65c., $412,147.22; silver, at $1.08, $623,463.48; gold, at $20.67, $42,655.89; total, $1,078,266.59. The works have at no time been run to their maximum capacity, and the output for 1884 would have been much larger had it not been for the strikes and the difficulty of obtaining teams for ore-hauling.

UTAH.

SALT LAKE COUNTY.

Walker Brothers' bank at Salt Lake City will be superseded by the Union National Bank of Salt Lake City, which has recently been organized, and which will shortly begin operations. The cash capital will be $200,000, and the officers will be Joseph R. Walker, President; Matthew H. Walker, Vice-President; and Benjamin G. Raybould, Cashier.

SUMMIT COUNTY.

ONTARIO.—The company's working force amounts to 420 men, 330 at the mine and 90 at the mill.

VIRGINIA.

LOUISA COUNTY.

SULPHUR MINES COMPANY OF VIRGINIA.—The mines have developed within the last eighteen months over 300,000 tons of high-grade pyrites, containing from 2 to 2½ per cent of copper. On the 250-foot level, in the center of a vein 37 feet wide, there are 15 feet of mixed copper pyrites that will run about 6 per cent copper. The shipments from this property in the past seven months were over 5000 tons. Greater facilities now will allow of a daily shipment of 100 tons.

WYOMING.

The efforts of the Laramie Board of Trade to secure subscriptions for the erection of reduction-works are progressing satisfactorily.

FERGUSON.—At a meeting of the stockholders, it was decided to erect a smelter at once, and Mr. Ferguson has gone to Denver, to make arrangements for the machinery.

FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, Feb. 13.

Business at the mining market needs an infusion of new life. The transactions, which for months have been featureless, dull, and uninteresting, remain so, and prices show little variation. The dealings this week show an increase of 3451 shares; as compared with those of last week, the total transactions amounted to 62,766 shares.

The Comstock stocks show the largest business. Consolidated California & Virginia sales amount to 8100; the price has been firm, ranging from 27@31c. Sutro Tunnel sold at from 11@12c., with sales of 7700 shares. Sierra Nevada's transactions amounted to 1000 shares at from 47@35c., closing at 40c. Navajo is the leading Tuscarora stock, and is quoted at from $1.25@$1.30, with sales of 1300 shares. North Belle Isle, from 21@23c., with transactions of 2700 shares. Among the other Nevada stocks, Eureka Consolidated is the most prominent, selling at from $2.50@$2.75. Of Albion Consolidated, 3000 shares changed hands, at low figures, from 8@9c.

The dividend declared by the Little Chief has increased the sales of this stock; 5200 shares changed hands at from 25@38c., closing at 35c. The price of Bassick also shows an upward tendency; 1055 shares were sold at from $2.90@$3.25. Amie Consolidated was steady at from 4@5c.; sales, 1100 shares. New Pittsburg shows a business of 1000 shares at from 45@48c.

The dealings in Horn-Silver have been small, compared with those of previous weeks; the sales being only 2880 shares at from $2.40@$2.85, closing at $2.40. In another column, we publish a statement in regard to the present condition of the company's affairs. Ontario shows a sale of 25 shares at $17; and Stormont one of 300 shares at 9c. In regard to the latter company, we learn from official quarters that the proceeds of bullion above the working expenses have been applied to the development of the property during the past year.

In Bodie stocks, Consolidated Pacific has been actively dealt in to the extent of 2500 shares, at from 83c.@$1. Standard Consolidated remains unchanged; the highest price during the week being $1.05, and transactions amounting to 2260 shares. Advices from San Francisco state that, after paying all expenses for January, the company will have $10,000 in the treasury. Bulwer Consolidated sold at from 5@10c., assessment unpaid, and from 29@81c., assessment paid; the dealings amounted to 2725 shares. Bodie Consolidated has been quiet at from $2.90@$3.25. Plymouth Consolidated has been actively dealt in at prices ranging from $15.38@$15.88, with sales of 1640 shares.

Father de Smet and Caledonia show a small business. The price of the former ranged from $5.25@$6, and that of the latter from $1@$1.05.

The New York Mining Stock and National Petroleum Exchange has listed all the stocks that are called at the New York Stock Exchange, and at noon to-day trading in these securities was begun. It is estimated that the transactions amounted to 15,000 shares in the afternoon, and all transactions were made ex-Clearing-House, as that will not be in operation until Monday, on and after which day the following stocks will be called at half-past ten and two o'clock. Business will be transacted on the basis of ten shares a unit, and clearances made through the American Loan and Trust Company: Chicago & Northwestern, Delaware, Lackawanna & Western, Erie, Kansas & Texas, Lake Shore, New York Central & Hudson River Railroad, New Jersey Central, Northern Pacific, Northern Pacific Preferred, Oregon Transcontinental, Pacific Mail, Reading, St. Paul, Texas Pacific, Union Pacific, Western Union, Erie Seconds, West Shore Firsts. All other stocks will be traded in ex-clearing house, as they are not included in the active list.

A complete summary of the market will be found elsewhere.

MEETINGS.

The annual meetings of the following companies for the election of trustees and the transaction of business will be held at the times mentioned:

Allentown Rolling-Mills, No. 237 South Third street, Philadelphia, Pa., February 18th, at noon.

Animas Silver Mining Company, No. 2 Wall street, New York City, February 24th, at twelve o'clock M.

Camuchin Consolidated Silver Mining Company, No. 2 Wall street, New York City, February 24th, at twelve o'clock M.

Comet Mining Company, office of Sutherland & McBride, Salt Lake City, Utah, February 28th.

Consolidated Batopilas Silver Mining Company, No. 2 Wall street, New York City, February 25th, at twelve o'clock M.

Descubridora Consolidated Silver Mining Company, No. 2 Wall street, New York City, February 24th, at twelve o'clock M.

International Coal Company (Limited), No. 14 Custom House Square, Montreal, Canada, February 18th, at noon.

Iron Silver Mining Company, Mills Building, 23 Broad street, New York City, March 4th, at twelve o'clock.

Lehigh & Wilkes-Barre Coal Company, No. 226 South Third street, Philadelphia, Pa., February 26th, at twelve o'clock M.

Lehigh Navigation Company, Board of Trade, Tenth above Chestnut streets, Philadelphia, Pa., February 24th, at eleven o'clock A.M.

Marquette Gold Mining Company, Marquette, Michigan, February 16th, at eight o'clock P.M.

New Giral Silver Mining Company, No. 2 Wall street, New York City, February 25th, at two o'clock P.M.

Osceola Consolidated Mining Company, No. 69 Devonshire street, Room 20, Boston, Mass., March 12th, at twelve o'clock M.

United Verde Copper Company, No. 154 Temple Court, New York City, February 16th, at twelve o'clock M.

Valenzuela Consolidated Silver Mining Company, No. 2 Wall street, New York City, February 24th, at twelve o'clock M.

DIVIDENDS.

Adams Mining Company, of Colorado, has declared a dividend (No. 8) of ten cents a share, or $15,000, payable on and after February 20th.

Homestake Mining Company, of Dakota, has declared its 78th dividend of $31,250, payable February 25th. Total dividends, to date $2,656,250.

Kossuth Mining Company, of Nevada, has declared a dividend (No. 1.) of six cents a share, payable March 16th.

Little Chief Mining Company, of Colorado, has declared a dividend (No. 11) of ten cents a share, payable March 4th.

Reading Iron-Works give notice that the coupons of the first mortgage bonds will be paid on demand at the Fidelity Trust Company, Philadelphia.

PIPE LINE CERTIFICATES.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

		Opening.	Highest.	Lowest.	Closing.	Sales.
Feb.	7	$0.69⅛	$0.74	$0.69⅛	$0.71¾	7,205,000
	9	.71¾	.72¼	.70⅛	.70⅝	4,552,000
	10	.70⅛	.71	.69⅞	.70⅝	3,662,000
	11	.71	.71⅛	.70⅝	.71	3,532,000
	12	.71¼	.71¼	.70¼	.70⅝	2,730,000
	13	.70½	.70½	.69⅞	.70	1,897,000
Total sales						23,578,000

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. Feb. 6.	Feb. 7.	Feb. 9.	Feb. 10.	Feb. 11.	Feb. 12.
Albion						
Alpha						
Alta	.30		.25		.30	.30
Argenta						
Bechtel						
Belcher						
Belle Isle						
Best & Belcher		.70	.75	.75	.70	.75
Bodie	1.87½	2.00	2.00	2.12½	2.00	2.00
Bullion						
Bulwer						
Challar	2.25	2.50	2.50	2.50	2.00	2.75
Con. Pacific		.75				.85
Con. Cal & Va.	.10		.10	.10	.10	.10
Crown Point						.85
Day						
Elko Cons						
Eureka Cons		2.75			2.75	
Exchequer						
Gould & Curry	.64¾	.65	.65	.65	.65	.65
Grand Prize						
Hale & Norcross	3.50	3.75	3.75	3.75	3.62½	3.75
Independence						
Martin White					.15	
Mexican	.30	.30	.30	.30	.30	.30
Mono						
Mount Diablo		3.75	3 62½	3.75		
Navajo	1.37½	1.25	1.37½	1.37½	1.37½	1.37½
Northern Belle						
North Belle Isle						
Ophir	.30	.30	.35	.30		.30
Overman						
Potosi	.75	.70	.75		.75	.85
Savage	.90	.90	.95	.90	.90	.95
Scorpion						
Sierra Nevada	.40	.40	.40	.40	.30	.30
Silver King						
Tip-Top						
Union Cons	.35	.35		.35		
Utah				.40	.55	
Wales Cons						
Yellow Jacket		1.25	1.25	1.25		1.25

Boston Copper and Silver Stocks.

[From our Special Correspondent.]

BOSTON, Feb. 12.

The feature of the market this week is the steady and persistent advance in Calumet & Hecla from $155 @$163, with only a slight reaction of $1, sales being made to-day at $162, and closing $161 bid, $162 asked. There have been good buying orders in the market that could only be filled by advancing the price, and at the highest price the sales were the smallest, most of the stock being obtained at $156@$160. The firmer price of ingot and the large production for January undoubtedly strengthened the stock and induced buying in anticipation of an early dividend. Quincy has been very steady and firm at $29@29¼; a small lot only sold at $28½. The reports regarding the outlook at the mine that have been current the past two weeks are not generally credited, but are looked upon as efforts to depress the stock for the purpose of covering short sales. The stock was firm to-day at $29 bid, none offered. Osceola declined ⅛ to $9⅞ on a sale of 17 shares only. There is but little of this stock in the market, and an order to buy a few hundred shares would result in much higher prices. We note sale of 500 shares of Allouez at 50c., the last sale being at $1, August 29th, 1884. Ridge also made an appearance after a long absence, with sales at 60@75c. The rest of the list of copper stocks entirely neglected.

In silver stocks, there is but little doing. Bowman Silver is steady at 10@11c. Dunkin, 18@20c. Catalpa, 20@22c. "Cusi," firm at $1 bid; $1.07½ asked. In miscellaneous stocks, Brunswick Berth sold at 20c. Standard water-meter, at 30c. American Electric and Illuminating Company, common stock, declined from $2⅞@$2 1-16, with auction sales at $2; later, the stock is firmer at $2⅝@$2 7-16. In view of the fact that this company pays regular semi-annual dividends of 8 per cent on the preferred and 4 per cent on the common stock, and is fast gaining in public favor with its system of lighting, the present price of the stock is undoubtedly cheap and worthy the attention of investors.

3 P.M.—There was no change in the market this afternoon, Calumet & Hecla sold at $162, and Quincy at $29, closing $29 bid, $29½ asked. Franklin, offered at $7.

BULLION MARKET.

NEW YORK, Friday Evening, Feb. 13.

Dull and lower Indian Exchanges for London, and apprehensions here of Congressional action looking to a limitation or suspension of the coinage of standard

dollars, have lowered the silver market abroad and here, as shown by our accompanying table.

DATE.	London. Fence.	N. Y. Cents	DATE.	London. Pence.	N. Y. Cents.
Feb. 7	49¼	107⅛	Feb. 11	49 5-16	107⅛
9	49⅛	107¼	12	49 3-16	107
10	49⅜	107¼	13	49 3-16	107

Foreign Bank Statements.—The governors of the Bank of England, at their regular weekly meeting, made no change in the bank's minimum rate of discount, and it remains 4 per cent. During the week, the bank gained £446,000 bullion. and the proportion of its reserve to its liabilities was raised from 46⅛ to 46⅝, against 40$^{13}_{16}$ per cent at this date last year. February 12th, the bank gained £59,000 bullion on balance. The weekly statement of the Bank of France shows a loss of 262,500 francs gold and a gain of 712,500 francs silver.

BULLION PRODUCTION FOR 1885.

MINES.	States.	Month of January.	Year from Jan. 1st, 1885.
		$	
*Belmont	Nev.	10,003	
*Father de Smet, G.	Dak.	15,002	
*Grand Prize, S.	Nev.	25,150	
*Granite Mountain, S.	Mont.	62,900	
*Head Center & Tranquillity	Ariz.	18,823	
*Hope, S.	Mont.	5,900	
*Lexington, G. S.	Mont.	61,183	
*Navajo, S.	Nev.	57,262	
*New Pittsburg, S.	Colo.	7,765	
*Plymouth Consolidated, G.	Cal.	85,722	
*South Yuba, G.	Cal.	400	
*Stormont, S.	Utah.	12,550	
		362,750	

*Official. G., gold; S., silver. Silver valued by the different companies from $1@$1.29·29 per ounce; gold, $20.67.

METALS.

NEW YORK, Friday Evening, Feb. 13.

The metal market is generally in a dull and cheerless mood, and the less that is said about it the better.

Copper—Remains unchanged for Pooled Lake, 10·80c. being the price for manufacturers this month, but outside of the pool the price is 11@11·25c., while good brands of Orford and Ansonia command 10¾@11c., and Baltimore and other brands may be quoted 10½@10¾c.

Some of the companies report a better feeling and larger orders from manufacturers for non-Lake copper. Cables received from London at the Metal Exchange to-day quote Chili Bars at £47 10s., firm. The price has fluctuated during the week from £47 17s. 6d. to £47 10s. Best Selected at London is quoted to-day at £52 10s., at which figure it has stood for some time.

Tin.—This metal is controlled by a few holders, and the quotation of last week scarcely needs alteration. Present quotations are 17·15@17·25c. Cables to-day quote Straits advancing yesterday, spot tin being £76 15s., and to-day £77 5s.; three months, £77 5s. and £77 15s., firm.

Lead.—There is nothing doing in this metal, a sale of 100 tons at 3·65c. being only sufficient to mark the price—3·70c. is still asked. The proposed stoppage of the Horn-Silver output for some months will not have much immediate effect upon the market, for it is known that several new mines, and some old, are ready to step in and fill the gap.

We publish in another column the statistics of production of lead for 1884, collected by our late editor, Mr. Charles Kirchhoff, Jr. They will be found full of instruction and give food for thought to those interested in this industry.

Messrs. John Wahl & Co., of St. Louis, telegraph to us as follows to-day: Market stationary, and a dull and easier feeling has prevailed since we reported a week ago. Home trade is very light. Still values remain unchanged. Desilverized lead held at 3·50c., and Common at 3·45c.

Spelter.—This market is quiet at 4·35@4·50c., and nothing of note to report.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Feb. 13.

American Pig.—Pig-iron shares with the other metals a dull and listless feeling, except in the case of such concerns as the Thomas Iron Company, where regular customers are taking rather more iron than usual. This is simply due to the fact that many consumers, tempted by the low prices of American irons, have tried and learned how to use a single brand, where formerly it was thought absolutely necessary to mix our domestic with Scotch, or some other domestic brands, for the same purpose. Prices are unchanged at $18@$18.50 for No. 1 Foundry; $17@$17.50 for No. 2; and $16@$17 for Gray Forge.

Sales are reported to us of several thousand tons of Lehigh irons, but the demand is still very quiet, and though this metal shows the nearest approach to an improvement that might indicate a general revival, yet the light is yet too faint to be able to assert that it is "daybreak."

Scotch Pig.—"Nothing doing," and the arrival of only "250 tons," show the depths to which this branch of the iron trade has sunk. Indeed, it appears to be rapidly approaching the "vanishing-point." Nominally Scotch brands are quoted here as follows: Coltness, Langloan, and Gartsherrie, $21@$22, in small lots; Glengarnock, $19.50@$20; Summerlee, $20.50; Eglinton, $19.

Cable quotations to the Metal Exchange to-day quote Coltness and Langloan, 54s. 6d.; Summerlee, 51s.; Gartsherrie, 51s. 6d.; Eglinton, 42s. 9d.; while private cables to-day quote Summerlee, 51s. 6d.; Coltness, 55s. 6d. Warrants 41s., with the market weak.

Philadelphia. Feb. 13.

[From our Special Correspondent.]

Pig-Iron.—The pig-iron market continues quiet. A few days ago, the hopes of makers were stimulated by inquiries for a good deal of mill iron particularly. Since then, very little iron has been sold. Mill-owners are carrying very light stocks. Makers had expected a slight improvement in the best irons. So far, it has not shown itself. The drop in coal has not made any difference. Pig-iron makers look for a further decline as soon as the spring opens, and have expected enough of a drop to give them fair margins, provided there is no further competition. There is some talk of a few furnaces going into blast soon, and there are probabilities that the rumors will prove true. The business, while very dull just now, will likely improve in March, as soon as consumers can make up their minds what to do. Southern iron has been recently delivered in small quantities, and as soon as freights are a little lower from the South, some parties will order the large lots that they have contracted for. The makers of Southern iron have certainly done their very best to open up a market here, and some of them are offering iron at prices that leaves them no margin whatever. There is perhaps as much iron made in the South at no profit as in the North, according to the opinion of parties who have recently been through the cheapest iron regions in the South. They will soon become tired of this kind of competition. Special brands are the only ones that are held firmly, for the reason that makers have managed to contract for most of their production for the winter. Standard brands are plenty, but there is less shading on some few, which have also been pretty well sold up. Foundry irons range from $16.50@$18.50, and the output does not seem to be any too large for the requirements of the market. Forge irons average $15.50. The extreme figures are $14.50@$16.

Foreign Irons.—The nominal quotations for Foreign Irons are $19.50 for Bessemer; Spiegel, $22@$32, according to percentage. No business is to be reported this week.

Blooms.—Two or three bloomaries have begun running full-time. As to prices, there is no perceptible change.

Muck-Bars.—Two or three lots were booked at $27.

Merchant Iron.—The reports are rather conflicting. Some parties report a slight improvement, and others report business extremely flat. Small sales are made here at $1.80. The expected improvement has not set in. The stores are carrying only small stocks, and it is likely that the purchasing of large lots will be deferred for some time yet. Common iron is quoted as usual at $1.50@$1.60. Manufacturers adhere to the opinion heretofore expressed, that there is room enough for a very good demand, and believe that it will come along in due time. The market, however, is at present without any interesting feature. Considerable interest is felt in what will be done by Western manufacturers over the scale question.

Nails.—Nails are nominally $2.10@$2.20. Outside operations have been checked by extremely cold weather. Deliveries are not quite as heavy. Several small lots of steel nails have been ordered. There is substantially no change in the present market situation. The announcement of new building shows that we shall probably have a very active spring.

Sheet-Iron.—One New Jersey sheet-mill has started up, with 125 men and fair orders. One more will start up next week. Several orders for galvanized have just been placed, and special orders for heavy plates are in negotiation. The local manufacturers look for an active month. Prices are without any change.

Plate and Tank-Iron.—The business of the week foots up very poorly, and most of the orders taken had to be shaded still further. Some parties are willing to take small business at the same prices that they have been quoting for large orders. This backwardness on the part of buyers is trying the patience of makers, who are about out of orders. Only two or three mills have business of any consequences.

Structural Iron.—There are negotiations in hand for a few hundred tons, but most of the business done is what it has been all along, in small lots. Angles are $2.10. The combination prices for beams and channels are adhered to, but there is no large business.

Steel Rails.—Makers of steel rails are loth to admit the fact that bidding on small orders has put prices down to $27, and that very little business is coming in. The situation is unfavorable. There is more or less talk about large orders coming.

Old Rails.—Old Rails are offered here at $18. There are buyers at $17.

Scrap Iron.—Yard men report a falling off of demand, but they are not able to follow buyers any farther.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Feb. 13.

Anthracite.

The very cold weather that has held its own through out the whole country has proved a greatly needed stimulant to the coal trade. The demand has increased in all sizes, though in manufacturing sizes this appears to be due rather to sympathy with the domestic coals, which are in great demand, than to any noticeable improvement in manufacturing business.

Stocks are working down, and there is a prospect of the market being in a pretty good condition by the end of the month, provided the production be limited to the February quota of 1,500,000 tons.

It is scarcely to be expected that the cold weather can continue much longer, so that we must not expect too much from the present active demand. Naturally the trade makes hay while the sun shines, and the prices of stove and chestnut coal have been slightly advanced. Stove coal of the best brands is quoted at $4, and $4.15 is asked in some cases, with no disposition to make contracts for large amounts, prompt delivery, at this price, though it is still possible to get fair to good stove coal at less than $4. Chestnut coal is quoted at $3.35@$3.50, though the latter price is only "asked." The manufacturing sizes, Broken and Egg, can still be obtained at $3, but $3.15 is obtained by some of the companies. "Circular prices" are quoted in some of the papers, and are named to "tender-feet" but are not obtained. The Reading Company's financial affairs still hang as a heavy cloud over the trade, and involve its future in some uncertainty.

Bituminous.

The much-talked-of pool that is supposed to be governing the tide-water bituminous trade continues to cause uneasiness in coal circles. Though it nominally does not go into force until March 1st, and is supposed to control in a cast-iron fashion all deliveries after that date, yet it is certain that the less known so-called Vanderbilt and Norfolk & Western coals must be offered at less than the Cumberland and Clearfield standard brands, or they can not enter the market at all. It is evident, therefore, that either the pool will limit the quantity of these coals coming forward and allow them to make their own figures, or the pool will promptly go the way of all its predecessors and become one of the coal trade "reminiscences." At present, no large contracts are making, and prices for immediate delivery are still far below the pool rates. Sales have been made at $2.85 alongside in this harbor, and we hear rumors of sales at Boston of $3.15@$3.40, delivered. We also hear of sales at $3 f. o. b. Amboy.

Quotations are those of the pool: $2.70 Baltimore,

NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	Feb. 7.		Feb. 9.		Feb. 10.		Feb. 11.		Feb. 12.		Feb. 13.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon.	....	....	1.90	....	....	....	1.95	....	....	....	....	....	200
Amie Con., Co.	....	....	....	....	....	....	.05	.04	....	....	....	....	1,100
Argenta	....	....	....	....	....	....	....	....	....	....	....	....	.....
Bassick, Co.	....	....	3.00	2.90	....	....	3.25	3.00	....	....	....	....	1,055
Belle Isle, Ne.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Bodie Cons., Ca.	2.00	....	....	....	2.10	....	2.30	2.25	....	....	2.25	....	975
Breece, Co.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Bulwer, Ca.	.07	.06	.29	.10	.31	....	.31	.30	.30	....	.06	.05	2,725
California, Ne.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Cal. & Hecla, Mich.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Castle Creek	....	....	....	....	....	....	....	....	....	....	....	....	.....
Chollar	....	....	....	....	2.75	....	....	....	....	....	....	....	200
Chrysolite, Co.	....	....	....	....	....	....	....	....	.80	.74	.73	.70	425
Cons. Cal. & Va., Ne.	.30	....	.28	....	.31	.28	.29	....	.29	.27	.28	....	8,100
Cons. Va., Ne.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Dunkin, Co.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Eureka Cons., Ne.	....	....	....	....	2.50	....	2.75	....	....	....	....	....	450
Father de Smet, Dk.	5.25	....	6.00	....	5.10	....	....	....	....	....	....	....	210
Findley, Ga.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Gold Stripe, Ca.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Gould & Curry, Ne.	....	....	....	....	....	....	....	....	.65	....	....	....	400
Grand Prize, Ne.	....	....	....	....	....	....	....	....	.10	....	....	....	1,500
Green Mountain, Ca.	.75	....	.85	.70	....	....	....	....	....	....	....	....	400
Hale & Norcross, Ne.	....	....	....	....	4.00	....	....	....	3.85	....	4.00	....	300
Hall-Anderson, N. S.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Homestake, Dk.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Horn-Silver, Ut.	....	....	2.80	2.75	2.85	2.80	2.65	2.60	2.65	....	2.55	2.40	2,880
Independence, Ne.	....	....	....	....	....	....	.02	....	....	....	....	....	300
Iron Silver, Co.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Leadville C., Co.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Little Chief, Co.	.32	.25	....	....	.32	.30	....	....	.38	.34	.35	....	5,200
Little Pittsburg, Co.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Martin White, Ne.	....	....	.15	....	....	....	....	....	....	....	....	....	1,000
Moulton	....	....	....	....	....	....	....	....	....	....	....	....	.....
Navajo, Ne.	....	....	....	....	1.30	....	1.30	1.25	....	....	1.30	....	1,300
Northern Belle	....	....	....	....	....	....	....	....	....	....	....	....	.....
North Belle Isle, Ne.	....	....	....	....	....	....	.21	....	.23	....	....	....	2,700
Ontario, Ut.	17.00	....	....	....	....	....	....	....	....	....	....	....	25
Ophir	....	....	....	....	....	....	....	....	....	....	....	....	.....
Plymouth	15.63	15.38	15.63	....	15.75	15.50	15.88	15.75	15.88	15.63	15.63	15.50	1,640
Quicksilver Pref., Ca.	....	....	....	....	....	....	....	....	....	....	....	....	.....
" Com., Ca.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Robinson Cons., Co.	.20	....	....	....	....	....	....	....	....	....	....	....	800
Savage, Ne.	....	....	....	....	1.10	....	1.10	....	....	....	....	....	300
Sierra Nevada, Ne.	.47	....	.42	....	.35	....	.40	....	....	....	....	....	1,000
Silver King, Ar.	....	....	....	....	....	....	4.00	....	....	....	....	....	100
Spring Valley, Ca.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Standard, Ca.	1.00	....	1.00	.99	1.05	1.00	.98	....	.90	....	.95	.90	2,260
Stormont, Ut.	....	....	....	....	....	....	....	....	.09	....	....	....	300
Tip Top, Ar.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Yellow Jacket	....	....	....	....	....	....	1.10	....	....	....	....	....	200

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	Feb. 7.		Feb. 9.		Feb. 10.		Feb. 11.		Feb. 12.		Feb. 13.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Albion	.69	.08	.09	....	....	....	....	....	....	....	....	....	3,000
American Flag	....	....	....	....	....	....	....	....	....	....	....	....	.....
Barcelona, G.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Bechtel Con., G.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Belvidere	....	....	....	....	....	....	....	....	....	....	....	....	.....
Best & B'licher, G. S.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Big Pittsburg, S. L.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Bradshaw, S.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Bull-Domingo, S.L.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Cal., B. H., G	....	....	....	....	....	....	1.05	....	....	....	1.00	....	431
Central Ariz'na, S.	.12	....	....	....	....	....	.17	....	.21	.19	.20	....	1,500
Climax, Co.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Colorado Central.	....	....	....	....	....	....	....	....	....	....	.75	.83	.75	900
Cons. Imperial	....	....	....	....	....	....	....	....	....	....	....	....	.....
Con. Pacific	....	....	....	....	....	....	.85	.80	1.00	.85	.90	.83	2,500
Decatur	....	....	....	....	....	....	....	....	....	....	....	....	.....
Durango, G.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Eastern Oregon	....	....	....	....	....	....	....	....	....	....	....	....	.....
Goodshaw, G.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Harlem M. & M. Co.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Hortense, S.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Kossuth	....	....	.03	....	....	....	....	....	....	....	....	....	1,000
Lacrosse, G.	....	....	.08	....	....	....	....	....	.09	.08	.10	.09	4,000
Mariposa Pref. G.	....	....	....	....	....	....	....	....	....	....	....	....	.....
" Com., G.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Mexican, G. S.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Mono	....	....	....	....	1.00	....	....	....	....	....	....	....	500
New Pittsburg	....	....	....	....	....	....	.47	.45	.48	.46	....	....	1,000
North Standard, G.	....	....	....	....	....	....	.04	....	....	....	....	....	100
N. Horn-Silv'r, S L.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Ori'nt'l & Miller, S	....	....	....	....	....	....	....	....	....	....	....	....	.....
Rappahannock, G	....	....	....	....	....	....	....	....	.07	.05	....	....	1,500
Red Elephant, S.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Ruby, of Arizona	....	....	....	....	....	....	....	....	....	....	....	....	.....
Silver Cliff, S.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Sonora Con.	....	....	....	....	....	....	....	....	....	....	....	....	.....
South Bodie, G.	....	....	....	....	....	....	....	....	....	....	....	....	.....
South Bulwer, G.	....	....	....	....	....	....	....	....	....	....	....	....	.....
South Hite	....	....	....	....	....	....	....	....	....	....	....	....	.....
South Pacific	....	....	....	....	....	....	....	....	....	....	....	....	.....
State Line, 1 & 4, S.	....	....	....	....	....	....	....	....	....	....	....	....	.....
" Nos. 2 & 3, S.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Sutro Tunnel	.11	....	....	....	.12	....	.11	....	.11	....	.11	....	7,700
Taylor Plumas	....	....	....	....	....	....	....	....	....	....	....	....	.....
Tioga	....	....	....	....	....	....	....	....	.27	.23	....	....	300
Unadilla, S	....	....	....	....	....	....	....	....	....	....	....	....	.....
Union Cons., G. S.	....	....	....	....	.43	....	....	....	....	....	....	....	300
....	....	....	....	....	....	....	....	....	....	....	....	....	.....
....	....	....	....	....	....	....	....	....	....	....	....	....	.....
....	....	....	....	....	....	....	....	....	....	....	....	....	.....
....	....	....	....	....	....	....	....	....	....	....	....	....	.....

Tables giving dividends and assessments will be printed the first week of each month. Dividend shares sold, 38,045. Non-dividend shares sold, 24,721.

$2.80 Philadelphia, $3.25 New York, $3.50 Boston; but from what we have said, quotations are simply conventional starting-points for negotiation. At the same time, we believe the dealers are unable to make contracts beyond March 1st at less than pool rates (and can make none at these) for Cumberland or Clearfield coals. The present uncertainty can not last more than a week or at most two weeks more, and no large contracts are likely to be given until the existing doubts of the vitality of the pool are removed.

Philadelphia. Feb. 13.

[From our Special Correspondent.]

As soon as the question of tolls and freights can be definitely determined, a large amount of business in anthracite coal will be done. Agents of large companies that have quietly looked over the ground here and in the East have reported that the prospects are favorable for a larger consumption than is apparent just at this time. The statement has been made in high circles that the allotments will barely be sufficient, and that, if maintained, there will be no difficulty in securing circular rates. One of the influences tending in this direction will be the settlement of the Reading affairs. Another will be, it is said, the assurance of perfect harmony. A third is, that the manufacturing demand will receive a stimulus. They are contrary to the opinions expressed, namely, that harmony between the companies is impossible; that the coal companies will cut prices; that manufacturing demand, while it may improve a little, will not be of such magnitude, as to absorb the allotted production, and so on. The hopes and apprehensions are about equally divided.

Mr. Whiting, of the Philadelphia & Reading Company, who is good authority, does not regard the present allotment as permanent. He says the old system of stoppages will be done away with by running some collieries steadily and stopping others permanently. Among those that will continue steadily are the Beachwood, Eagle Hill, and Eagle collieries. The Locust Gap will probably be closed down for the rest of the year. The Reading Company will make a reduction of 20 cents a ton on its tolls on coal to Philadelphia from March 1st.

The Lehigh Company is reported to have secured a large amount of business in large orders, and the individual operators are finding an active demand for all the coal they can mine. There are heavy unfilled Eastern requirements, but freights are high and vessels are scarce. There are rumors of a further advance in coal here, but it is likely to be restricted to stove coals. Good authorities say that it is impossible to name a price, excepting for stove coals, which are bringing pretty nearly circular rates, while other sizes are ranging from 15 to 50 cents below circular rates, and even more. It is stated here to-day that the Reading Company will reduce the price of coal on March 1st, but while not affirmed nor denied, it is believed by well-posted men to be true.

Stove coal may sell at or near circular rates, for a few weeks during the cold snap, but it will feel the effects of competition in other sizes, and very probably follow them. The action of the Delaware, Lackawanna & Western and the Delaware & Hudson companies in advancing stove and chestnut coal is regarded simply as taking advantage of a temporary scarcity. The cleaning up of stocks is likely to go on rapidly. Inquiries from Western buyers are favorable, and large orders are likely to be booked soon.

In bituminous coals there are rumors of large orders. Certain it is, that there are inquiries for large lots, some of them from Eastern parties. Some sharp cutting in bituminous coals is to be expected. There would be more confidence if the trade could feel assured concerning the pool arrangements. A few days will develop something interesting, some knowing ones say.

Buffalo. Feb. 12.

[From our Special Correspondent.]

No changes have been published yet in relation to prices of anthracite coal, but a new schedule is expected every day.

Nothing has been ascertained as to whether a definite result was arrived at as a consequence of the late meeting of bituminous producers and shippers here.

Coke is nominally without any new features; it appears to be understood that the syndicate arrangement of last year will be continued this year. Generally speaking, all parties are satisfied with the plan.

Last Friday, the soldiers who for the past few days have been guarding the United States property adjoining the Delaware & Lackawanna docks (see last week's letter for particulars) returned to Fort Porter, having been withdrawn by orders from the Secretary of War. It is expected that the difficulty is approaching an amicable settlement, as Major McFarland, U.S.A., is in town consulting with the company's representatives. Carpenters are busy, when weather permits, in repairing the trestles and building additional pockets in readiness for next season's business.

The Lehigh Valley Railroad Company is arranging plans with the view of finding new markets for its anthracite coal. Its recent acquisition of the Southern Central Railroad, running from a point near Waverley, N. Y., to Fair Haven, New York, 154 miles, will provide new territory, as will also its connections with the Pennsylvania Railroad down the Schuylkill Valley in competition with the Reading Railroad. These connections will be completed early next fall, so that the product of the new coal lands of the company will be made available for distribution.

The extreme cold of the past week and at present time of writing, made the demand for fuel quite lively and retailers especially rejoiced at it. On Wednesday, the thermometer at one time read 15 degrees below zero; the wind varying from 35 to 52 miles an hour during the day. "Business was knocked endwise," says a local paragrapher; "the cold was so cold, and the wind so windy, you see that it was well-nigh out of question to walk or drive in comfort. Even at the busy hours of the day, the busiest streets were well-nigh deserted. The snow snowed crosswise, and the snow clouds, instead of falling to earth, flew along up the streets like a swarm of white hornets—and how they stung when they struck your cheeks! Snow bullets, flying at 50 miles per hour, are things to dodge, if you can. But you can't. The gale bombarded the town until the buildings were plastered and coated in frozen snow and sleet."

I have not seen any advertisements relative to the supplying of the Grand Trunk Railroad of Canada with coal.

Sharp tactics are reported to be in use among the railroad people with regard to bituminous coal freights, but the limits of this letter precludes details. The Erie system is said to be that coal for local points turned over to this road by other contracting roads is charged extra freight, varying from 25 to 55 cents a ton.

The Pennsylvania Railroad Company will, it is said, conduct its anthracite coal trade to suit itself, selling any quantity and at whatever price it pleases. Dealers

here do not seem to borrow any trouble about the future of the coal trade; they are as cool as the weather.

Boston. Feb. 12.

[From our Special Correspondent.]

The cold has brought a little business to the anthracite trade. Not only stove but broken coal has been in demand for quick shipment, and we have heard of fancy prices being paid where prompt delivery was guaranteed. This tends to prove that most dealers who have dared do so have been running on very small stocks. This little flurry does not affect the general market, however. The guiding spirits in the coal market may see their way clear, but they are unable to make the trade believe it. The entire coal market is in an unsettled, mixed-up condition, and buyers are only adopting the most natural and wisest course in holding off.

The receipts of coal at this port for the month of January, as compared with January, 1884, show a falling off of 20,070 tons, as the following table will show:

	January. 1885.	1884.
Philadelphia	24,340	31,493
New York	17,587	27,875
Baltimore	31,222	34 037
Richmond, etc	5,763	5,567
Total	78,902	98,972

The fact that the sales agents of several New York and Philadelphia anthracite companies have recently been in this market gives rise to the natural impression that they are interviewing mill treasurers. A very important point comes in here, and that is concerning the future course of the anthracite companies with regard to this class of consumers. The fight of anthracite against bituminous for steam purposes is surely a losing one, and must be if prolonged. Now that bituminous is selling here at $3.50 delivered, will the anthracite men endeavor to prevent the loss of any more tonnage to their bituminous brethren? Retailers see that a controversy on this point is likely to depress the whole market, domestic sizes with the rest. Hence they will buy from hand to mouth, whatever the programme of production may be, until this point is decided.

F. o. b. prices remain nominally as noted last week. We quote:

At New York, Stove, $3.85@$4; Egg, $3.20@$3.50; Broken, $3.20@$3.40; Pea, $2.25; Nut, $3.45@$3.60. At Philadelphia, $3.90@$4 for Stove; $3.25@$3.50 for Egg; $2 for Pea; $3@$3.15 for Broken. Special coals, $4.75@$5 for Broken, $5.35@$5.50 for Stove.

Matters in the bituminous branch of the market are in a worse rather than better condition. Business has begun to move in earnest; but as for the pool, its power seems to be felt in some quarters, while in others it is apparently disregarded. This can not long continue. The railroads have begun to buy. The Boston & Maine is said to be after 100,000 tons. The Lowell is thought to have bought 60,000 tons of a Cumberland concern, and a Portland concern is reported to have sold 15,000 tons to the Portland & Ogdensburg Railroad. The interest of the week has centered in the Fitchburg Railroad contract for 70,000 tons. The pool seems to have been disregarded in this contract, or else there was some heavy cutting on that portion of the tonnage coming all rail. The minimum price permitted by the pool on water freight was made by one of the unsuccessful bidders, say $3.59, through three bridges. The contract was taken by a Clearfield operator. It may be that a guarantee of the lowest price of the season was made, or that some such tactics secured the contract. The dullness in manufacturing lines causes a backwardness in that line. We hear of one contract of 6000 tons to an iron manufacturing concern. Cargo lots continue at $3.60@$3.70 delivered. The minimum rate on contracts under the pool is $3.50 delivered. This figure is surely the maximum.

The receipts of provincial coal are continually declining, so far as this market is concerned. For 1880, they footed up 66,212 tons; 1881, 52,095; 1882, 43,092; 1883, 58,716; and in 1884, 39,548 tons. The United States is, however, largely increasing its exports of anthracite to Canada, although a duty of 50 cents a ton is levied. For the fiscal year ended June 30th, 1884, they were 610,977 tons out of a total export of anthracite to all countries of 649,040 tons. The Province of Quebec took 526,425 tons.

There is no change to note in freights. We quote:

New York, $1@$1.15; Philadelphia, $1.25@$1.50; Baltimore, $1.25; Newport News, $1.20@$1.25; Richmond, $1.25@$1.35; Cape Breton, $1.55@$1.60; Bay of Fundy, $1.30@$1.40.

There is only a fair retail trade, at unchanged figures. We quote:

White ash, furnace and egg	$5.25@$5.50
" " stove and nut	5.50@ 5.75
Red ash, egg	6.00
" " stove	6.25
Lorberry, egg and stove	6.50@ 6.75
Franklin, egg and stove	7 50
Lehigh, furnace, egg, and stove	5.50@ 5.75
" nut	5.75

Wharf prices, $4.50 for Broken, $4.85 for Stove.

STATISTICS OF COAL PRODUCTION.

Comparative statement of the production of anthracite coal for the week ended February 7th, and year from January 1st:

Tons of 2240 lbs.	1885. Week.	1885. Year.	1884. Week.	1884. Year.
D. & H. Canal Co.	47,405	246,089	42,155	275,422
D. L. & W. RR. Co.	59,601	298,665	80,087	414,508
Penna. Coal Co.	17,340	78,083	16,129	92,026
L. V. RR. Co.	19,471	104,501	20,921	121,895
P. & N. Y. RR. Co.	2,815	12,275	3,516	17,714
North & West Br. RR.	19,673	124,178	14,900	88,172
L. V. RR. Co.	82,274	316,693	77,100	406,362
S. H. & W. B. RR.	2,641	11,924	4,180	20,365
C. & R. RR. Co.	179,668	712,384	180,554	901,613
St Line&Sul.RR.Co.	1,703	8,439	1,495	7,931
Total	432,591	1,903,231	441,057	2,346,008
Increase				
Decrease		442,777		

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Total same time in 1880	2,359,012 tons.
" " " " 1881	2,407,059 "
" " " " 1882	2,439,637 "
" " " " 1883	2,774,235 "

The increase in shipments of Cumberland Coal over the Cumberland & Pennsylvania Railroad and branches amounts to 2,124 tons, as compared with the corresponding period of 1884

Comparative Statement of the Production of Bituminous Coal for the week ended February 7th, and year from January 1st:

Tons of 2000 pounds, unless otherwise designated.

	1885. Week.	1885. Year.	1884. Week.	1884. Year.
Cumberland Region, Md.				
Tons of 2240 lbs	32,937	182.442	26,497	174,779
Barclay Region, Pa.				
Barclay RR., tons of 2240 lbs	5,397	26,894	10,961	42,147
Broad Top Region, Pa.				
Huntington & Broad Top RR., tons of 2240 lbs	3,287	15,858	2,774	20,911
East Broad Top				
Clearfield Region, Pa.				
Snow Shoe	3,089	22,581	5,075	23,682
Karthaus (Keating)	1,551	6,170		
Tyrone & Clearfield	53,158	311,779	37,372	285,529
Alleghany Region, Pa				
Gallitzin & Mountain	9,651	52.385	7,422	57,328
Pittsburg Region, Pa.				
West Penn RR.	3,590	28,295	5,910	45,292
SouthwestPenn.RR.	1,612	11,488	3,464	18,863
Pennsylvania RR.	3,413	19,454	5,635	32,814
Westmoreland Region, Pa.				
Pennsylvania RR.	26,619	129,966	17,756	131,100
Monongahela Region, Pa.				
Pennsylvania RR.	3,510	20,551	3,631	19,405
Total	147,814	827,663	125,597	854,850
Decrease		27,187		

Comparative Statement of the Transportation of Coke over the Pennsylvania Railroad for the week ended February 7th, and year from January 1st:

Tons of 2000 pounds.

	1885. Week.	1885. Year.	1884. Week.	1884. Year.
Gallitzin & Mountain (Alleghany Region)	3,552	21,063	2,711	14,097
West Penn. RR.	36	550	1,587	14,604
Southwest Penn. RR	34,837	182,701	42,573	233,754
Penn. & Westmoreland Region, Pa. RR	4,463	27,229	3,220	22,078
Monongahela, Penn. RR.	1,174	7,082	1,621	8,777
Pittsburg Region, Pa. RR.				47
Snow Shoe (Clearfield Region)	380	2,231	653	2,737
Total	44,442	240,876	52,365	296,694
Decrease		55,818		

Belvidere-Delaware Railroad Report for the week ended February 7th:

	Week.	Year 1885.	Year 1884.
Coal for shipment at Coal Port (Trenton)	112	1,028	
Coal for shipment at South Amboy	5,624	49,288	47,328
Coal for distribution	16,174	72,833	86,074
Coal for company's use	5,388	23,976	23,537
Total	27,298	147,125	156,939
Increase		9,814	
Decrease			

FREIGHTS.

Coastwise Freights.

Per ton of 2240 lbs.

Representing the latest actual charters to February 13.

Ports.	From Philadelphia.	From Baltimore.	From Elizabethport, Port Johnston, South Amboy, Hoboken, and Weehawken.
Alexandria			
Annapolis			
Albany			
Baltimore			
Bangor			
Bath, Me			
Beverly			
Boston, Mass.		1.50	
Bristol			
Bridgeport, Conn.			
Brooklyn		1.30	
Buffalo, N. Y.			
Cambridge, Mass.			
Cambridgeport			
Charleston, S. C.		1.25	
Charlestown			
Chelsea			
City Point			
Com. Pt., Mass.			
E. Boston			
East Cambridge			
E. Gr'nwich, R. I.			
Fall River			
Galveston		2.25	
Gardiner, Me			
Georgetown, D.C.			
Gloucester			
Halifax			
Hartford			
Hackensack			
Hudson			
Lynn			
Marblehead			
Medford			
Millville, N. J.			
Milton			
Newark, N. J.			
New Bedford			
Newburyport			
New Haven		1.25	
New London			
New Orleans			
New-Berne			
Newport			
New York		1.25	
Norfolk, Va	.80		
Norwich			
Norwalk, Conn			
Pawtucket			
Philadelphia			
Portland, Me.		1.50	
Portsmouth, Va.			
Portsmouth, N.H.			
Providence	1.20	1.25	
Quincy Point			
Richmond, Va.			
Rockland, Me			
Rockport			
Roxbury, Mass.			
Saco			
Sag Harbor			
Salem, Mass.			
Saugus			
Savannah		1.50	
Somerset		1.40	
Staten Island		1.10	
Trenton			
Troy			
Wareham			
Washington			
Weymouth			
Williamsbg, N.Y.			
Wilmington, Del.			
Wilmington, N.C.		1.25	
St. Thomas, W. I.			
Key West, Fla.			

* And discharging. † And discharging and towing. ‡ 3c. Per bridge extra. § Alongside. ‖ And towing up and down. ¶ And towing. ** Below bridge.

No other charters. River badly blocked with ice.

PHILADELPHIA. C. K. SCHULL, Supt.

HOMESTAKE MINING CO., MILLS BUILDING, 15 BROAD STREET.

NEW YORK, Feb. 13, 1885.

DIVIDEND NO. 78.

The regular monthly dividend—TWENTY-FIVE CENTS per share—has been declared for January, payable at the office of the company, San Francisco, or at the Transfer-Agency in New York, on the 25th inst. Transfer-books close on the 20th inst.

LOUNSBERY & CO., Transfer-Agents.